

September 1976

Forest Disease Research in the Western United States and British Columbia, Canada

by Thomas S. Buchanan

U.S. Department of Agriculture - Forest Service
Southeastern Forest Experiment Station
Asheville, North Carolina

U. S. FOREST SERVICE

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FOREST DISEASE RESEARCH

in the

WESTERN UNITED STATES

and

BRITISH COLUMBIA, CANADA

Thomas S. Buchanan

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ACKNOWLEDGMENTS

In putting together this history of forest disease research I have drawn heavily upon my personal contacts as a professional forest pathologist in various parts of the West, and in various roles, over the years since 1928. I have also made use of the scientific literature, perused official files on occasions, and relied heavily upon published obituaries, prepared by those who knew them best, of those early pathologists who are no longer among us.

But the real meat was gathered through personal interviews on a trip West in September and October 1972 for that specific purpose made possible by the U. S. Forest Service. On that trip I visited with most all personnel now active in Forest Disease Research at these U. S. Forest Service Research Stations:

Intermountain

Rocky Mountain

Pacific Southwest

Pacific Northwest

and at these universities:

University of Idaho

Washington State University

Oregon State University

University of California (Berkeley)

I also attended the 20th annual meeting of the Western International Forest Disease Work Conference in Victoria, B. C. where it was possible at one place to contact representatives of forest disease research in British Columbia, the University of Arizona, the University of Washington, and other

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key people. Voids still left were filled by short trips to Athens, Georgia; Raleigh, North Carolina; and Washington, D. C., to contact former western pathologists now located in those places, and by personal correspondence with key persons not otherwise available.

Finally, special thanks are given to the following retirees who went out of their way to meet with me and personally review the "good old days" of forest disease research:

Stuart R. Andrews

Ezra M. Hornibrook

Warren V. Benedict

Benton Howard

Roy Blomstrom

James W. Kimmey

Thomas W. Childs

Harold R. Offord

Ross W. Davidson

Theodore C. Scheffer

Marvin E. Fowler

Ernest Wohletz

Ernest Wright

Thomas S. Buchanan
U. S. Forest Service (Retired)
Asheville, North Carolina
June 30, 1973

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FOREST DISEASE RESEARCH IN THE WESTERN UNITED STATES

AND BRITISH COLUMBIA, CANADA

INTRODUCTION

This history is intended to cover all forest disease research in the West whether conducted by Federal or Dominion governments, universities, or private industry. It is further intended to cover the total time span from inception to the end of calendar year 1972 and that geographic area west of the Great Plains and generally west of the Continental Divide. It thus both supplements and augments in scope and extends in time the historical report prepared by Carl Hartley on the Division of Forest Pathology, U. S. Department of Agriculture, and published as Supplement 195 to the Plant Disease Reporter on September 15, 1950. It is, therefore, suggested that readers first acquaint themselves with Dr. Hartley's work which perforce was painted with a rather broad brush since it dealt with the national picture. This report will of necessity entail some repetition but, hopefully, will provide additional specific detail wherever this does occur. Since the U. S. Department of Agriculture is still the major employer of forest pathologists, the Washington Office organization is included, giving detailed attention only to top echelon personnel and such staff members as may have at one time or another been assigned or detailed to work somewhere in the West. This same philosophy will be followed when considering in more detail the work of the western Stations, consideration being given only to those who were involved sufficiently long to have made a significant contribution.

A similar approach has been taken in developing the bibliography shown for those persons included in the Appendix at the end of each section. No attempt has been made to have this be a complete bibliography of forest

disease research in the West but rather to show the more significant of the author's publications and the period of time and range of subjects over which he was involved.

Similarly, in considering work done at the various universities, no attempt has been made to list every student, undergraduate or graduate, who ever took a course in Forest Pathology; only those who went on to become actively involved in Forest Disease Research or some closely allied field are named.

OFFICE OF FOREST PATHOLOGY
BUREAU OF PLANT INDUSTRY
U. S. DEPARTMENT OF AGRICULTURE



Around 1910, the staff of the Office of Forest Pathology trooped outside for a session of picture taking.

The imposing array presented above has been identified as (from left to right):

Carl Hartley, J. F. Collins, E. E. Carter, N. E. Watkins, T. C. Taylor, W. H. Long, C. J. Humphrey, G. G. Hedgcock, E. P. Meinecke, Haven Metcalf, J. R. Weir, Della Ingram, and Perley Spaulding.

HEADQUARTERS ORGANIZATION IN THE UNITED STATES

It all started on July 1, 1899, at the Shaw School of Botany, Washington University, St. Louis, Missouri, with the assignment there of a field agent from the Division of Vegetable Physiology and Pathology, Bureau of Plant Industry, U. S. Department of Agriculture. Dr. Hermann von Schrenk was selected to start this primary effort, continuing for a time in his regular position as Instructor in Botany as well as serving as Special Agent for the Department. Dr. von Schrenk had already displayed his interest in forest pathology, having just completed his doctoral dissertation on a heart rot problem and published on the effects of an 1896 tornado on the trees of St. Louis.

Precisely two years later, this pioneering effort was formalized into the Mississippi Valley Laboratory when the Secretary of Agriculture authorized by letter the conduct of experiments and investigations "relating to diseases of timber and fruit, forest, shade and ornamental trees" at this laboratory in St. Louis and throughout the Mississippi Valley and other western sections. One can only wonder if the Secretary fully realized what a tremendous task he was asking one man to do and if von Schrenk was fully aware of the impossibility of the assignment he had accepted. Relief came, however, in 1902 when G. G. Hedgcock and Perley Spaulding were added to the staff; later on Ernst Bessey and Caroline Rumbold joined them. While the staff was concerned with tree pathology and forest fungi, von Schrenk had an overriding interest in the chemical preservation treatment of timbers. This interest was doubtless influenced by the tremendous demands of the railroads for cross ties to keep pace with their westward expansions at that time. This basic difference between von Schrenk and the Division of Forestry on research priorities led to closing the Mississippi Valley Laboratory on July 1, 1907, when von Schrenk left the

Federal service for industrial employment, and his assistants were reassigned to a new Federal agency established that same day.

On July 1, 1907, by direction of the Chief of the Bureau of Plant Industry, the Laboratory of Forest Pathology was established with headquarters in Washington, D. C. to assume the functions of the former Mississippi Valley Laboratory. Dr. Haven Metcalf, with three or four years of teaching experience behind him and a year as Pathologist in the Bureau of Plant Industry, was selected to organize this new laboratory and was named Pathologist in Charge. Dr. Metcalf brought in George G. Hedgcock and Perley Spaulding, each of whom had by then completed a Ph.D. in forest pathology at Washington University, from the now defunct Mississippi Valley Laboratory, to form his original technical staff. In 1909, the official title of this organization was changed to the Office of Investigations in Forest Pathology and it was changed again in 1931 to the Division of Forest Pathology, in both instances functioning within the Bureau of Plant Industry.

Dr. Metcalf was but 31 years old when given this new assignment but served with great distinction as head of these organizations until death by his own hand (by pistol on the zoo grounds in Rock Creek Park) on May 23, 1940. As indicated above, the first two technical men added to his staff held doctoral degrees. This standard of excellence was expected of all permanent employees so long as Metcalf was in charge. To this day, this standard is still maintained in Federal forest disease research, with many men earning their advanced degrees on the job. Dr. Metcalf was possessed of a strong personality, a keen mind, and a penetrating insight to the problems both of the forest and the people he gathered around him to work on them. Though no Peter Hurkos, Metcalf was gifted with significant psychic powers, but since he spoke little of it, few people were aware of this unusual side of his character, or of the uses to which it was put.

From the beginning, Metcalf was a firm believer in equal employment opportunities for it was not long before at least six women^{1/} held important positions somewhere within the organization. But he didn't relax his academic standards even so, for four of these held Ph.D. degrees. And Miss Gott, his almost life-long private secretary, was certainly an important influence in the functioning of the unit.

From the beginning, disease research was conducted under the strongly centralized administration of the Washington headquarters. With an original technical staff of but two people, Dr. Spaulding seems to have been given primary responsibility for the eastern half of the country, especially chestnut blight. Dr. Hedgcock roamed the National Forests of the West by primitive means in what must have been a fascinating period of pathological and mycological survey, observation, and collection. He early recognized the importance of the dwarf-mistletoes, the gall rusts, needle fungi, and heartrots, yes, even air pollution, as being primary enemies of the western coniferous forests.

Some say Hedgcock's travels could be charted by the trail of forest fires he left behind. George was an inveterate pipe smoker, probably using more kitchen matches, which he carelessly tossed aside wherever he might be, than tobacco. When once asked if smoking in the woods wasn't dangerous, he is said to have replied, "I've been smoking in the woods all my life and only started three forest fires and but one of those got to be a big one."

Despite his good natured reputation as a walking firebrand, Dr. Hedgcock so impressed western Forest Service officials with the importance of forest tree diseases and the need for research on them that an agreement was drafted on March 21, 1910^{2/} requesting that pathologists be assigned to all western forest districts.

^{1/} Dr. Catherine G. Duncan, Dr. C. Audrey Richards, Dr. Carolina T. Rumbold, Dr. Alma W. Waterman, Annie Rathbun (Gravatt), and Alice J. Watson.

^{2/} See copy attached in Appendix.

As a consequence of this agreement, the following assignments were made in due course, thus forming the nucleus of the present far flung field organizations:

1910	R-5	Dr. E. P. Meinecke	Consulting pathologist in charge
1913	R-1	Dr. James R. Weir	"
1914	R-3	Dr. William H. Long	"
1920	R-6	Dr. John S. Boyce	"

Programs conducted out of these field headquarters will be considered individually in more detail later on.

Over the years, many other prominent pathologists served for variable periods of time on Dr. Metcalf's Washington Office technical staff. Among them were the following:

J. L. Bedwell	G. F. Gravatt
R. Kent Beattie	Carl Hartley
Russell Clapper	L. W. R. Jackson
Jesse D. Diller	R. P. Marshall
Marvin E. Fowler	Curtis May
Lake S. Gill	Ralph M. Nelson
Anne Rathbun Gravatt	A. S. Rhoads

Carl Hartley, Flipppo Gravatt, Kent Beattie, and Marvin Fowler had the longest tenure, and Lake Gill and Jess Bedwell moved on to head up work at western stations. Beattie had western experience as a systematic botanist, having served in the Botany Department at Washington State College from 1899 to 1912.

With Metcalf's demise in 1940, Dr. Carl Hartley was named "Acting in Charge" for the intervening months until a permanent replacement was selected. In 1941, Dr. Lee M. Hutchins was drafted from the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, to become the new Head of the Division of Forest Pathology. He transferred into Washington from Fort Valley, Georgia, where for several years he had been involved with fruit trees, especially peach virus disease investigations at the Federal experiment station there. Lee retained the same staff Dr. Metcalf had at that time, namely, Hartley, Flipppo Gravatt, Diller, May and Fowler.

The Bureau of Plant Industry was placed under the Agricultural Research Administration (ARA) by Secretary's memorandum dated December 13, 1941, and became the Bureau of Plant Industry, Soils, and Agricultural Engineering (BPIS&AE) on February 12, 1943, by ARA Administrative Memorandum 5, approved by the Secretary. The Division of Forest Pathology remained in the BPIS&AE of the ARA in the Department of Agriculture until its activities were transferred to the Forest Service on January 2, 1954, by Secretary's Memorandum 1320, Supplement 4, dated November 2, 1953. It then became the Division of Forest Disease Research in the research arm of the Forest Service.

At the time of transfer, only Hartley, Diller and Fowler elected to come into the Forest Service along with Dr. Hutchins. Hutchins and Fowler were headquartered in Washington and Hartley in Beltsville, Maryland. Diller was also headquartered in Beltsville though actually becoming an employee of the Northeastern Station. May and Gravatt elected to stay in the Agricultural Research Service with enough shade tree and chestnut work left there to occupy their time until retirement.

When the Division of Forest Pathology was moved into the Forest Service in 1954 there were some shifts in responsibilities that are difficult to document and perhaps even more difficult to rationalize. Formerly, the Division had had responsibility for all tree pathology research. The shift left shade and ornamental tree research in ARS, but what few shade trees are there that are not also forest trees, or, conversely, what few forest trees are there that cannot also be used for shade and ornamental purposes? Even more peculiar, research to develop chestnuts for nut production went to ARS while research on developing a blight resistant chestnut timber tree came to the Forest Service. Work on the bacterial disease of the giant or saguaro cactus in the Southwest was also moved to ARS. Responsibility for research on tree diseases

causing problems to the National Park Service was divided even more strangely. Problems around "headquarters areas" became an ARS responsibility; elsewhere in the Parks and Monuments it was a Forest Service responsibility. Some interpreted this to mean that if the problem could be worked on from, for example, the front porch of Sunset Lodge, it belonged to ARS. If one had to walk out in the woods to do it, the responsibility belonged to the Forest Service.

Following Hartley's retirement in 1957, Hutchins and Fowler comprised the entire Washington Office staff. This was perfectly in keeping since Forest Service research was highly decentralized, most responsibility being delegated to the field, thus making a big headquarters staff unnecessary. In 1959, however, Marvin had been placed in charge of the pole blight aerial survey in Idaho, and even earlier he had been temporarily made responsible for the giant cactus work in Arizona.

As various internal adjustments were made in the Forest Service organization, the Division of Forest Disease Research became, in effect, as did Forest Insect Research and Forest Fire Research, a Branch in the Division of Forest Protection Research. Fire Research was eventually separated out as an independent Division with status equal to that of the Division of Forest Insect and Disease Research. Ultimately the Washington Office pathologists came to serve, for all intents and purposes, as Staff Assistants to the Division Director

Many staff changes have taken place since Dr. Hutchins retired in 1956 to his apartment in Washington except for the considerable time he still spends working on cushion diseases of cacao in Costa Rica. Dr. John R. Hansbrough was brought in from his position as Division Chief, Forest Disease Research, Northeastern Forest Experiment Station, New Haven, Connecticut, to replace him. Dr. George H. Hepting, who occupied a comparable position in the

Southeastern Station, Asheville, North Carolina, had first been considered for the job but was unable to accept. Marvin Fowler continued on as Hansbrough's assistant for only a few months when he moved to the Northeastern Station to fill the position vacated there by Hansbrough, from where he retired in October 1963 to serve as Secretary-Treasurer of the George Washington Masonic National Memorial Association, Alexandria, Virginia. In August 1956, Dr. Thomas S. Buchanan, who was between tours of foreign assignment with the International Cooperation Administration, was talked into accepting the position of second in command. Hansbrough had had two or three year's experience in the West some years earlier and Buchanan was a native westerner and had worked in that region for the old Office of Forest Pathology and the Weyerhaeuser Timber Company, and had taught and done forest disease research at the University of Idaho for four years. Thus, for the first time, the Washington Office was staffed with a team having strong western interests and experience and strong forestry background.

Buchanan transferred into a position as Assistant Director of the Southeastern Station, Asheville, North Carolina, in August 1964, and retired there on June 23, 1972. Robert W. Brandt was then brought in from a Project Leader's position in the Northeastern Station as Hansbrough's new assistant. Hansbrough retired to his old haunts near New Haven, Connecticut on January 12, 1968, and Brandt was moved into the position he vacated. Then John Ohman came in from the Lake States Station as his assistant. John didn't stay long until he moved out again as an Assistant Director at the Northeastern Station and, not too long afterward, on up the ladder to become Director of the North Central Station at St. Paul. Brandt was without an assistant for a short while until he, too, left in early 1971 to accept an ARS position with the PL-480 program as Assistant Director of the European program with headquarters in Rome.

In June 1971, Keith R. Shea came in from his Project Leader's position in Corvallis, Oregon, to take the top Washington Office pathology position and was soon followed by Eldon W. Ross from the annosus project at Athens, Georgia, to occupy the second position. Once again the Washington Office had strong western representation, a desirable admixture of southeastern experience, and an equally strong forestry background in both incumbents. Shea had led the Diseases Reducing Timber Production project at Corvallis, Oregon, and had worked precisely ten years as pathologist with the Weyerhaeuser Company at Centralia, Washington, before that. Thus the major timber growing segments of the country are now represented by the forest pathologists in Washington Forest Service headquarters.

APPENDIX

von Schrenk, Hermann

B.S. Cornell University 1893
A.M. Harvard University 1894
Ph.D. Washington University (St. Louis) 1899

Publications:

von Schrenk, Hermann

1901. Fungus diseases of forest trees. Yearbook of the Dept. of Agriculture for 1900, pp. 199-210. (byline as Instructor in the Shaw School of Botany and Special Agent in the Division of Vegetable Physiology and Pathology, Dept. of Agric.).

1902. THE DECAY OF TIMBER and methods of preventing it. U. S. Dept. of Agric., Bur. Pl. Indust. Bull. No. 14, 96 pp., illus. Mar. 25. (byline as Instructor in Henry Shaw School of Botany and Special Agent in charge of Mississippi Valley Laboratory.)

1903. Seasoning of timber. U. S. Dept. of Agric., Bur. Forestry, Bull. No. 41, 48 pp., illus. (byline as in charge of Mississippi Valley Laboratory, Bur. Plant Ind., assisted by Reynolds Hill, Bur. Forestry).

1904. Cross-tie forms and rail fastenings, with special reference to treated timbers. U. S. Dept. of Agric., Bur. of Forestry, Bull. No. 50, 70 pp., illus. (byline as in charge of Forest Products, Bur. of Forestry).

and Perley Spaulding

1909. Diseases of deciduous forest trees. U. S. Dept. of Agric., Bur. Plant Ind. Bull. No. 149, 85 pp., illus. June 30. (byline as formerly expert in charge of the Mississippi Valley Laboratory of the Bur. of Plant Ind., and Pathologist, Investigations in Forest Pathology).

Metcalf, Haven

A.B. Brown University 1896
A.M. Brown University 1897
Studied at Harvard in 1899 and at Indiana in 1900
Ph.D. University of Nebraska 1903

Spaulding, Perley

B.S. University of Vermont 1900
M.S. Washington University 1903
Ph.D. Washington University 1906

Hedgcock, George Grant

B.S. University of Nebraska 1899
A.M. University of Nebraska 1901
Ph.D. Washington University 1906

Publications:

Hedgcock, George G.

1910. A new polypore on incense cedar. *Mycologia* 2: 155-156.

1912. Winter-killing and smelter-injury in the forests of Montana. *Torrey* 12: 25-30.

1912. Notes on some diseases of trees in our National Forests. II. *Phytopath.* 2: 73-80.

1913. Notes on some western Uredineae which attack forest trees. *Mycologia* 4: 141-147. 1912. *Phytopath.* 3: 15-17.

1913. Notes on diseases of trees caused by mistletoes. *Jour. Wash. Acad. Sci.* 3: 265-266.

1915. Notes on some diseases of trees in our National Forests. *Phytopath* 2: 73-80, 1912; 3: 111-114, 1913; 4: 181-188, 1914; 5: 175-181.

Scheffer, T. C. and G. G. Hedgcock

1955. Injury to northwest trees by sulfur dioxide from smelters. USDA Tech. Bull. 1117-49. (This was written by Scheffer long after Hedgcock's death. Ted had assisted Hedgcock on this work way back in 1928, 1929, and 1930, and George had been involved in the Ducktown, Tennessee case as far back as 1914. It was estimated that the Trail smelter alone put 250 million pounds of sulfur in the air in 1928.)

Fowler, Marvin E.

- A.B. (Biol.) Central College, Fayette, Mo. 1926
M.A. (Plant Path.) George Washington University 1931

Publications:

Fowler, Marvin E.

1950. Airplane scouting for pole blight of western white pine. Jour. For. 48: 23.

Hutchins, Lee M.

- B.S. Michigan State College 1913
Ph.D. (Pl. Physiol.) Johns Hopkins 1924
Other work at Montpellier 1919 and at Wageningen and Paris 1930

Hansbrough, John R.

- Ph.B. Brown University 1925
A.M. Brown University 1926
Ph.D. (For. Path.) Yale University 1936

Buchanan, Thomas S.

- B.S. (For.) University of Idaho 1935
M.S. (For.) University of California 1937
Ph.D. (For. Path.) Yale University 1943

Brandt, Robert W.

- B.S. Michigan State University 1950
B.S. (For.) Michigan State University 1951
M.S. Michigan State University 1955
Ph.D. State University of New York, College of Forestry 1958

Ohman, John W.

B.S.	(For.) University of Minnesota	1957
M.S.	(Pl. Path.) University of Minnesota	1958
Ph.D.	University of Minnesota	1961

Shea, Keith R.

B.S.	(For.) University of Minnesota	1950
Ph.D.	(Pl. Path.) University of Wisconsin	1954

Ross, Eldon W.

B.S.	(Agr. Sc.) West Virginia University	1957
M.S.	(Pl. Path.) West Virginia University	1958
Ph.D.	(For. Path.) State University, College of Forestry at Syracuse (N.Y.)	1964

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MEMORANDUM OF AGREEMENT

BETWEEN THE FOREST SERVICE AND THE BUREAU OF PLANT INDUSTRY, REGARDING THE WORK
IN FOREST PATHOLOGY IN THE NATIONAL FOREST DISTRICTS

- - -

In accordance with the agreement of January 25, 1907, between the Forest Service and the Bureau of Plant Industry, the Bureau of Plant Industry, through its Office of Investigations in Forest Pathology, will, as soon as practicable, place a consulting pathologist in each National Forest District to advise and assist the District Forester in the immediate control of diseases of forest trees and forest products, and to study such diseases in order to devise methods for their ultimate control. The appointment shall be approved by the Forest Service.

The control of the diseases of forest trees and of forest products is to be considered a work of immediate necessity, and as such is to take precedence over other work. In this control work the consulting pathologists will be under the direction of the District Forester, who will make assignments of work and give instructions regarding the place and general plan of conducting the work. The technical methods employed shall be those approved by the Bureau of Plant Industry, which may also give recommendations as to the relative importance of the work to be taken up.

Technical studies of diseases of forest trees and forest products for the purpose of devising methods for their ultimate control shall be carried on only as the work of immediate disease control will permit. All technical studies shall be carried on under the direct supervision of the Bureau of Plant Industry, which shall select the problems and direct the work, but members of the Forest Service may at any time make suggestions as to the relative importance of the problems to be taken up. The Bureau of Plant Industry

shall pay the salary and traveling expenses of the consulting pathologist, and also any other expenses incurred for work done under its supervision. The Forest Service shall furnish office room, furniture, and stenographic help (but not apparatus for technical work), for the consulting pathologists, and defray all expenses incurred in carrying out the recommendations of the consulting pathologist for the immediate control of diseases when such expenses are authorized by the District Forester. Copies of all reports and memoranda relating to diseases shall be submitted to both Bureaus.

It is understood that the Bureau of Plant Industry may bring the consulting pathologist to Washington once a year, but the time for this shall be arranged with the District Forester so as to interfere as little as possible with the District work.

The Forest Service shall join with the Bureau of Plant Industry in recommending to the Secretary of Agriculture an appropriation for the fiscal year 1912 sufficient in amount to cover such pathological work in the National Forest Districts as may be considered necessary.

The pathological work in the Districts and at the Forest Products Laboratory shall be noted in the Monthly Field Program of the Forest Service, by giving the names and addresses of the men and indicating the cooperative character of the work.

Approved:

(Signed) Henry S. Graves
Forester
Forest Service

(Signed) C. H. Powell
Acting Chief,
Bureau of Plant Industry

(Signed) Wm. L. Hall
" Raphael Zon

" Haven Metcalf
" Perley Spaulding

Committee on Forest Pathology

DISTRICT (REGION) 5

PACIFIC SOUTHWEST FOREST & RANGE EXPERIMENT STATION

Dr. E. P. Meinecke was selected in 1910 by Dr. Haven Metcalf to man the first of the new posts of Consulting Pathologists in Charge soon after the memorandum of agreement between the Forest Service and the Office of Forest Pathology, Bureau of Plant Industry, was signed on March 21. Just how Metcalf got a line on Meinecke and was able to place him in this pioneering position in San Francisco is not known, but it was certainly a fortuitous selection.

Meinecke brought with him a depth of training, experience, awareness, and communicative ability rarely duplicated in Forest Disease Research. Although born in Alameda, California, he and his parents returned to their native Germany when he was but seven years old. All of his schooling was there, and over the years he studied under many famous Herren Professoren and Docenten at the various universities he attended. He also had practical work experience under such as V. Meyer, Schimper, Bütschli, and Pfitzer, and for one year was assistant to Robert Hartig who is universally recognized as the father of forest pathology. When assigned to San Francisco, Meinecke had but recently completed a 3-year stint as Assistant Professor of Botany at the University de la Plata in the Argentine.

Meinecke roamed the forest of California and Nevada when a man with his keen powers of observation and interpretation could find something new and of importance and significance to forest pathology at almost every turn of the trail. It was his ability to see the significance of his findings to forest management practices that provided the key to his well earned fame. He early recognized, for example, that every tree killed by disease was not necessarily a net loss, that tourist trampling could threaten the life of even a giant redwood, and,

yes he even foresaw the environmental complications that accompany the excessive use of the camper-trailer.

John S. Boyce served as one of Meinecke's earliest scientific assistants over the years 1913 to 1920, during which time he earned his doctorate at Stanford. Another Stanford man, Harry Lachmund, also assisted him on his mistletoe plots and deterioration studies during the approximate period 1916 to 1919. Both men moved to Region 6. And Willis W. Wagener started his career with him in 1920, a career that was continuously active in California until his death almost fifty years later. Arthur S. Rhoads worked for Meinecke from 1917 to 1921, leaving San Francisco to go into cereal investigations, but has since been in and out of Federal forest disease research for a number of years. Yet another Stanford man, Lake S. Gill, joined Dr. Meinecke's crew and assisted him and Wagener from 1923 to 1925. Lake then had a tour of duty out of the Washington office working on the deterioration of blight killed chestnut. He returned to San Francisco in 1930 and worked there again until 1932 at which time he was transferred to the New Haven office to expedite work toward his doctoral degree under Dr. Boyce at Yale. In 1934 he was moved to the Albuquerque office to work under Dr. Long, spending the rest of his career in the Southwest. Ernest Wright dropped out of his graduate studies at California for a year in 1927 to work for "The Doctor" but stayed on to work also under W. W. Wagener, leaving in 1935 to head up the shelterbelt pathology work in Lincoln, Nebraska, and conduct the first Texas root rot surveys in Texas and Oklahoma.

In addition to being an exceptional scientist, Meinecke was a wonderful teacher and his influence on men who once served under him has been profound. It is interesting to note, however, that none of these men shared authorship with Meinecke on any publications. In many other respects he was a man of extraordinary talents and wide interests. He painted in oils and watercolors, played the piano,

was an accomplished skier and figure skater, a gourmet cook, and a connoisseur of fine foods. He had a solid foundation in Latin and Greek, fluent command of five modern languages, and a reading knowledge of several others. He could do all of this because he never married! If there were any weaknesses in his scientific armor it may have been the fact that statistical analyses left him cold-- a feeling that he also transmitted to those around him.

Although Meinecke was a pioneer, he did not rough it in the same sense Hedgcock and Weir did in the Northwest. He always traveled first class, whether by horseback, motor car, or train. The finest of camping equipment was reserved for his personal use and manual labor was not of his choosing. Meinecke often projected the image of a typical Prussian autocrat, complete with dueling scars; at other times, the typical European Herr Doktor Professor. In the early thirties he was designated as coordinator of forest disease research at western stations and his periodic visits caused more scurrying and "snap to" activity by far than did similar visits from the Chief himself, Dr. Haven Metcalf.

Meinecke served continuously in charge of the San Francisco office until 1928. He then accepted national responsibility as consulting pathologist for the National Park Service. He held this post until he retired to his home in San Francisco in 1939, but he always had been available to his old cohorts in the office of Forest Pathology for consultation. He died in 1957.

Willis W. Wagener was selected in 1929 to replace Dr. Meinecke. Except for time out for graduate study, Wag had worked continuously for Dr. Meinecke since 1922 and had the benefit of his counsel and advice for still another ten years. Dr. Wagener was one of the very few forest pathologists in the Federal service who was able to spend his entire career at one post.

Wag was a tireless worker, and like his predecessor and mentor, relied on observations and impressions for his conclusions rather than employing the strictly

scientific method with statistically based experimental design and replication. Nonetheless, his work was sound and has stood the test of time. He hesitated to publish until he had all of the facts; consequently, many of his publications came years after his first field observations and much probably still remains buried in the files. His special interests included the plant rusts and the relation between forest diseases and climate. He became a world authority on the diseases of Monterey cypress. Forest managers have accepted and used many of his findings on the impact of fire, weather, and non-infectious disorders on the vigor and stability of forest stands. He also emphasized the relationship of tree defects to personal hazard in recreational sites, and played a leading role in establishing a guide to detection and evaluation of defects for practicing recreational land managers.

Wag retired to his home in Berkeley in 1962 at the mandatory age of 70, but continued as a consultant to the Pacific Southwest Forest and Range Experiment Station until he died at the wheel of his car on a local expressway in 1969.

A number of prominent pathologists were privileged to work under Wag during his years in California. James L. Mielke came down from the Portland, Oregon office in January 1935 where he had been working since 1924 on white pine blister rust studies. Jim was hoping for a change in problem assignments, but the very next year after his transfer he discovered the first white pine blister rust on sugar pine in California, and so found himself right back in rust work. He put in his residence requirements for his Ph.D. at Yale in 1937-1938. In 1942, he was transferred to Albuquerque to man that office while Gill and Stuart R. Andrews were off to the wars.

George Zentmeyer was picked up in 1937 while still a graduate student at the University of California and worked with Wag on his studies on the effect of climate on spread of tree diseases. They authored an office report in 1940

which concluded that "the results of their survey work definitely indicate that moisture conditions in California will be less favorable for the rust than in other white pine regions where the rust is established, and thus support the views of those who have held this belief." Another joint office report of a year earlier dealt with the development of Cronartium ribicola on Ribes roezli and host reactions under conditions of natural infection in California. George left in April 1940 to accept a position with the Connecticut Agricultural Experiment Station. Later in his career he earned fame as an international authority on Phytophthora root diseases while on the faculty of the University of California at Riverside.

Thomas S. Buchanan, a classmate of Zentmeyer, also had the benefit of a month of Wagener's benevolent influence when he worked in the San Francisco office during the 1936-37 winter semester break, also enjoying the experience of commuting to work via ferry across the Bay. Again in 1938 Buck was detailed from the Portland, Oregon, office to California for the summer where on Dead Horse Ridge at the foot of Mt. Shasta near McCloud, California, he started another series of ribes-to-pine spread plots, this time from Ribes roezli and R. nevadense to sugar pine. He was assisted by Gordon Dunshee from the Office of Blister Rust Control and they were provided with laborers for the requisite ribes eradication work by the State of California from relief camps. Two truckloads of "pogies"^{1/} arrived in the middle of the night at the base camp with only their California suitcases (cardboard cartons) a minimum of ambition, but terrific appetites.

Mrs. Marian Cave was employed from 1941 to 1943 and brought to bear her talents as a cytologist in differentiating between the two very similiar western white pine rusts.

^{1/} Presumably a species of indolent fish which lies quietly near the bottom of sluggish waters and waits for food to drift into its mouth.

James W. Kimmey was moved down from Portland to San Francisco in the spring of 1941 and went to work immediately on war projects; ventilation and decay in wooden ships and defense housing. With the reorganization in 1954, Jim went with the Pacific Southwest Station and headquarters were moved from San Francisco to Berkeley. During the summers of 1952, 1953, and 1954, however, he was detailed to Alaska, first on disease surveys and then on cull studies of spruce, hemlock, and cedar. Marvin Fowler, who had been placed in charge of forest disease surveys in the Washington office, assisted on some of the survey work during 1952 and 1953. Kimmey's cull factors are still used by foresters in Alaska. He also built up an herbarium of over 250 collections for the Juneau office and sent duplicate specimens to the National Herbarium in Beltsville, Maryland. He studied blister rust on sugar pine and associated ribes in the Sierra Nevada of California with Jim Mielke. In 1949 he worked on the statewide forest disease survey and initiated work on the cull factors in commercial California species of conifers that are still used by foresters. He did more work on the deterioration of fire-killed timber and helped Wag on his projects. When Mielke left for Albuquerque in 1942, Kimmey was placed in charge of white pine blister rust research. In the winter of 1943-44 he had another short detail, this time to the sunny Southwest to help Mielke in research on the saguaro disease in Arizona. Kimmey left the Bay area in 1957 to take over as Division Chief of Forest Disease Research at the Intermountain Station in Ogden, Utah.

In August 1947, Paul Lightle moved into the San Francisco office after completing his Master's degree at the University of Arizona where his problem had to do with the bacterial disease of the saguaro cactus. Paul worked in Region 5 until 1956, but had his headquarters changed in 1952 to Placerville. His main line of research was on Elytroderma deformans and his work on this

also yielded his doctoral dissertation at the University of California. In June 1956 he was transferred to Gulfport, Mississippi, as a disease research project leader there. In 1960 he moved back to the Albuquerque office.

Harold R. Offord was placed in charge of forest disease research in the Pacific Southwest Station in 1956 at the time of reassignment to the Forest Service of responsibilities for blister rust control. Dr. Wagener had requested to be relieved of his administrative duties in order to devote full time to writing up his backlog of notes that had accumulated over the years. Offord had had a world of disease research related work, having spent his professional life in charge of chemical control work in the D. & I. unit of the Office of Blister Rust Control. Nor was he any stranger to the Berkeley area, having at times occupied laboratory and greenhouse space on the University campus, and, as early as 1926 had negotiated a cooperative agreement between OBRC and the College of Agriculture. This must stand among the earliest, if not the first, Federal cooperative agreements between a forestry activity and a university. Offord continued his affiliations with OBRC, at least to the extent of being paid out of their funds, until the Division of Forest Disease Research was set up in 1956 and he was named Chief. At that time both Wagener and Kimmey were still at hand to assist him in completing his transition from chemist to pathologist.

Clarence R. Quick, who had also spent his early career in OBRC, much of it as a plant ecologist working on the chemical control of ribes directed by Offord, joined the Pacific Southwest Station in 1956. He continued to explore the possibilities of chemical control of white pine blister rust on sugar pine and of dwarfmistletoes on various conifers. He retired to Clarksburg, California, in 1958.

The Office of Blister Rust Control had worked very closely with the California Pest Action Council and Offord was able to bring their support to

bear also on forest disease research. In fact, Drs. Bega, Smith and Scharpf, current members of the Pacific Southwest disease research staff, took their graduate work at the University of California, Berkeley, under California Pest Action Council sponsored grants.

Offord retired in 1965 to his home in Berkeley where he has combined the gentlemanly pastime of bowling on the green with serving as a consultant to the Forest Service disease research project. Robert V. Bega was named as his successor. Bob had been in forest disease research since early 1956, but some of his time had been spent in graduate study at the University where he was involved with the genetics and sexuality of fungi, aerobiology, and fungus physiology in relation to disease spread and development, virology, and electron microscopy.

Dr. Bega was reassigned as Project Leader in 1962 and seems to have taken off at once for Hawaii to study the forest and wildland diseases there. (He must have found some problems for he was back there again in late 1972.)

Bega was listed as principal investigator in a \$50,000-a-year research grant from the U.S. Public Health Service initiated in 1966 and extended in 1967, to study the susceptibility and resistance of western conifers to air pollution damage. This study was funded by the Environmental Protection Agency until June 1972 when the grant and the study were terminated. He and his staff have developed control techniques for nursery diseases. Costly control measures for white pine blister rust were discontinued on four National Forest of California where Bega's research showed that natural control factors were adequate to keep the disease in check.

As a Project Leader Bega continues research on root and soil borne organisms; Fomes annosus, microclimate and meteorology relations in white pine blister rust, the disease produced by air borne chemical toxicants, and subtropical forest diseases.

Douglas R. Miller, with a lifetime of California blister rust control experience behind him, took over the California forest disease survey work when Jim Kimmey left in 1957 for Ogden. Reed had been in the San Francisco Regional Office for a couple of years before moving over to the Station in 1956. In 1961 he transferred back to the Regional Office and remained there until he retired in 1970. While working on disease survey, Reed, of necessity, and through personal interest, became a competent mycologist of California's forest fungi. Another claim to fame was his YEA BEAVER! yell given at the slightest provocation, especially at Western International Forest Disease Work Conferences.

Hubert H. Bynum joined the forest disease research group at Pacific Southwest as a Forestry Aid on June 18, 1956. Hart played a major role in formulating and initiating a new type of forest disease survey using randomly selected temporary plots in California. He was co-author of the Manual of Instructions for this survey and helped supervise its operation for several years. With his knowledge, experience, energy, and enthusiasm, he rose to the professional grades and worked with heart rots and became proficient with the grafting of both white pine blister rust and dwarfmistletoe infection as a research tool. On May 8, 1966, he was promoted and transferred to Region 6 with headquarters in Medford, Oregon, where he was most active in forest pest control work until his untimely death in February 1972.

Lee A. Paine was the next addition to the staff, joining the Pacific Southwest Station as Research Plant Pathologist in 1957. He had had previous Forest Service and Bureau of Entomology and Plant Quarantine experience followed by work as a Research Officer (Forest Pathology) with the Canadian Science Service from 1953 until 1957. Although his graduate studies were on the epidemiology of white pine blister rust and the response of hardwoods to mistletoes, his early Station work was concerned with heart rot fungi where

he studied the stains and decays of lodgepole pine and red fir at high altitudes in California. This stimulated his interest in the hazard potential of various defective tree species in recreational areas. Carrying on pioneering efforts of Dr. Wagener, he is still the only man in the Forest Service conducting research in this aspect of recreational hazard. Lee devotes essentially his full time to this effort where he investigates the basic factors involved in hazard, and the development of techniques for its evaluation and control. The results of the multiagency, nationwide studies are used in intensive recreation site management throughout the country.

Robert F. Scharpf was next to join the crew, coming to Berkeley first as a Forestry Aid (Research) in July 1957. He was inspired to pursue graduate work in forest pathology through contact and work on oak wilt with the late Ted Bretz at the University of Missouri and Tom Jones of the USFS, Columbia, Missouri. Interspersing periods of work with periods of graduate study, his first permanent appointment as a professional pathologist came on July 11, 1960. All of Bob's graduate work was at the University of California (Berkeley) where he studied the biology and pathology of phanerogamic parasites and fungus hyperparasites.

His special problem assignments are to develop controls of dwarfmistletoes and the true mistletoes in pines and true firs of all age classes. Bob's research has been such that he is now one of the authorities on the mistletoes of the world along with Dr. Frank Hawksworth of the Rocky Mountain Station in this respect within the Forest Service. This research has led to a more thorough knowledge of the life cycle, epidemiology, and control of the dwarfmistletoes of North America. Guidelines for the silvicultural approach to control of dwarfmistletoe on pine and true firs have been established as a result of his research.

Richard S. Smith, Jr., was first employed as a professional forest pathologist at the Berkeley Station in January 1962 and a little over a year later received

his first promotion following completion of requirements for his doctorate degree at the University of California. His special problem assignments are to develop controls of diseases of seeds and nursery seedlings and to determine the biology and control of root diseases in planted and natural stands. More specifically, this involves nursery diseases, black stain root disease, the ecology of Fusarium, Fomes annosus control, and Macrophomina phaseoli population studies.

The last scientist to join the Pacific Southwest staff of forest pathologists was Paul R. Miller. He first came to the Station in November 1966 after eight years' affiliation with the University of California as Extension Assistant, Graduate Research Assistant, and finally as Assistant Research Pathologist.

His specific assignment was to conduct research on the effects of air pollution on the health of forest trees, including species susceptibility, interrelationships and action of air pollutants, nature of physiogenic disturbances in trees, and the relationship of air pollution injury to other forest tree pests. This assignment has meant essentially to study the dying of forest trees in the Lake Arrowhead region of California where, at times, the polluted air trapped in the Los Angeles basin pours over the lower passes of the San Bernadino Mountains. Paul worked more or less isolated from the rest of the Pacific Southwest pathologists, having been physically located at Riverside most of the time. With an ever decreasing budget, minimal help and equipment provided largely through his own imagination and initiative, he has done a marvelous job.

Looking back over 63 years of forest disease research in Region 5, one can easily observe the transition from broad scope observational activity, through more generalized areas of study, to the current specific and highly technical detailed studies of segments of problems already identified. The trend has been only natural; as more is learned, the harder it becomes to add

something new, but the tools improve, too, so progress goes on. One does have to wonder, however, if a staff essentially all trained at the same school is really the ultimate in desirability.

The technical forest disease research staff at the Pacific Southwest Station now consists of Dr. Lee A. Paine, Dr. Robert F. Scharpf, and Dr. Richard S. Smith, Jr., at Berkeley, and Dr. Paul R. Miller at Riverside, all under the technical supervision of Dr. Robert V. Bega, Project Leader for Biology and Control of Forest Diseases. Bega is also located at Berkeley as is Dr. Donald W. Lynch, a silviculturist, the Assistant Director administratively in charge.

APPENDIX

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Universities of Freiburg, Leipzig, and Bonn
Ph.D. Heidelberg University 1893

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Wright, Ernest

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UNIVERSITY OF CALIFORNIA

Berkeley

The University of California has for many years had one of the strongest Plant Pathology Departments in the country. It is only relatively recently, however, that specific work in forest pathology has been offered and still more recent that significant forest disease research has been undertaken. Perhaps the slow start can be explained by the overriding importance of agronomic and horticultural crops to the economy of the State. Perhaps, too, the fact that an outstanding team of federal pathologists had been continuously very active in Forest Service Region 5 since 1910 had a determining influence.

Such outstanding scientists as R. E. Smith, T. E. Rawlins, H. N. Hansen, J. T. Barrett, W. C. Snyder, and W. N. Takahashi have worked for many years at California around the fringes of forest pathology, but all were more or less specialists in narrower fields, particularly as related to mycology and virology. At least three of these men had received all or most of their graduate training at California and were absorbed directly into the faculty thereafter. A course in forest pathology was first offered by "Nick" Hansen in the thirties.

It was not until 1937 that Hansen and Smith published on even a minor forest pathology problem, the bacterial gall of Douglas-fir. It is interesting to note that perhaps the first significant forest pathology publication coming out of California (1931) was not from the Plant Pathology Department at all but was authored by Emanuel ("Mr. Redwood") Fritz of the Forestry School and Lee Bonar of the Botany Department and concerned the all important brown rot of the redwood which von Schrenk had noted thirty years earlier. (For several years Dr. Bonar taught half of the instruction offered in basic mycology while Dr. Barrett taught the other half in the rival Plant Pathology Department.)

There is room for errors of omission, for sure, but it appears that prior to 1950 only Carl P. Hartley, W. W. Wagener, Ernest Wright, George A. Zentmeyer, T. S. Buchanan, and Paul C. Lightle were or still are among the forest pathologists active in the West who received some or all of their graduate pathology training at California.

In 1957, Dr. John R. Parmeter, Jr., was brought to the University specifically to teach and conduct research in forest pathology. Dick was well qualified for this new position having studied under Dr. Lew Roth at Oregon State and Drs. Kuntz and Riker at Wisconsin. While at Oregon State it had been his good fortune to assist Lew, Dr. John S. Boyce, Mr. Wagg, and others on their intensive study of the heart rots in old-growth Douglas-fir. He also brought with him two years of experience with the Division of Forest Disease Research, first at the Forest Products Laboratory in Madison on microclimate studies and then at Rhinelander, Wisconsin, on the decays in northern woods.

The California Forest Pest Action Council had exerted their influence in encouraging the University to offer a stronger program in Forest Pathology. Encouragement also came from the Division of Forest Disease Research in the Pacific Southwest Station, especially from H. R. Offord who was Division Chief at that time. It was in response to these urgings that Dr. Parmeter was brought to the Berkeley campus. He has since been heavily involved with research on dwarf mistletoes, Fomes annosus, and X-disease (air pollution) on the Crestline. In much of his research, graduate students were and are an intimate part of the work force and many of these are Pacific Southwest Station employees. It follows quite naturally that an exceedingly close and exceedingly fine spirit of cooperation exists between the two institutions. In many cases, the line of demarcation is impossible to discern, especially as concerns joint authorships.

In August 1963, Dr. Fields W. Cobb, Jr., joined the staff to work with Dr. Parmeter, thus forming one of the strongest duos in university forest pathology teaching and research in the West. Fields brought with him an educational and work experience background equally as strong and broad as Parmeter's. He had studied under J. S. Boyce at Yale and with C. L. Fergus, W. J. Stambaugh, and F. A. Wood at Pennsylvania State. He had had practical work experience with the Forest Service at Lake City, Florida, where he worked on pitch streak and dry face of pines. He then transferred to Gulfport, Mississippi, and work on the brown spot needle disease of longleaf pine, cone rust, and also on the annosus root rot survey. After his period of graduate study at Yale, he worked with the Agricultural Marketing Service for a year before going to Pennsylvania State University for further graduate study where he worked on oak wilt and Fomes annosus.

Since coming to California, Dr. Cobb has worked very closely across the board with Dr. Parmeter--in research as well as in teaching and guiding graduate students, although one or the other must be the "major professor." His efforts have been on the western rusts, root diseases, especially Fomes annosus, and interdisciplinary projects coordinated with the Entomology Department on the relations between bark beetles and forest tree disease. This led into involvement with the smog problem and opened up a variety of work; biochemical, soils, succession, etc. Root work is now shifting from Fomes annosus to Verticicladiella and Armillaria but attention is also being given to Dothistroma and to the effects of fire (or lack of fire) on stand composition and other possible deleterious effects.

APPENDIX

Fritz, Emanuel, and Lee Bonar

1931. The brown heart-rot of California redwood. J. Forest. 29:
368-380.

Hansen, Hans Nicholas

B.S. University of California (Berkeley) 1924

M.S. University of California (Berkeley) 1925

Ph.D. University of California (Berkeley) 1928

Students:

G. A. Zentmeyer

T. S. Buchanan

P. C. Lightle

R. V. Bega

R. F. Scharpf

Paul Miller

Publications:

Hansen, H. N., and R. E. Smith

1937. A bacterial gall disease of Douglas-fir, Pseudotsuga
taxifolia. Hilgardia 10: 569-577.

Parmeter, John R., Jr.

B.S. (Bot. & Pl. Path.) Oregon State University 1951

Ph.D. (Pl.Path.) University of Wisconsin 1955

Students:

R. F. Scharpf

R. S. Smith, Jr.

P. R. Miller

H. S. Whitney

L. S. Felix

R. W. Meyer

(All current professionals in Region 5 Forest Pest
Management are California graduates.)

Publications:

Stark, R. W., P. R. Miller, F. W. Cobb, Jr., D. L. Wood, J. R. Parmeter, Jr.,
and E. Savarin

1968. Photochemical oxidant injury and bark beetle (Coleoptera:
Scolytidae) infestation of ponderosa pine. Hilgardia 39(6):
125-152. May.

Parmeter, J. R., Jr.

1970. Rhizoctonia solani: biology and pathology. (Edited by Parmeter.) U. of Cal. Press, 255 pp., illus. Berkeley, Los Angeles, and London.

_____, R. T. Sherwood, and W. D. Platt

1969. Anastomosis grouping among isolates of Thanatophorus cucumeris. Phytopath. 59(9): 1270-1278. Sept.

Cobb, Fields W., Jr.

B.S. (For.Mgt.) North Carolina State University 1955

M.S. (For.) Yale University 1956

Ph.D. (Pl.Path.) Pennsylvania State University 1963

Students:

D. L. Nelson

J. W. Byler

R. S. Hunt

Publications:

Cobb, Fields W., Jr., and W. Wayne Wilcox

1967. Comparison of susceptibility of Abies concolor and Pinus ponderosa wood to decay by Fomes annosus. Phytopath. 57(12): 1312-1314.

Stark, R. W., P. R. Miller, F. W. Cobb, Jr., and D. L. Wood

1968. Photochemical oxidant injury and bark beetle (Coleoptera: Scolytidae) infestation of ponderosa pine. I. Incidence of bark beetle infestation in injured trees. Hilgardia 39(6): 121-126.

Cobb, F. W., D. L. Wood, R. W. Stark, and P. R. Miller

1968. Photochemical oxidant injury and bark beetle (Coleoptera: Scolytidae) infestation of ponderosa pine. II. Effect of injury upon physical properties of oleoresins, moisture content, and phloem thickness. Hilgardia 39(6): 127-134.

Miller, P. R., F. W. Cobb, Jr., and E. Savarin

1968. Photochemical oxidant injury and bark beetle (Coleoptera: Scolytidae) infestation of ponderosa pine. III. Effect of injury upon oleoresin composition, phloem carbohydrates, and phloem pH. Hilgardia 39(6): 135-140.

Cobb, F. W., Jr., D. L. Wood, R. W. Stark, and J. R. Parmeter, Jr.
1968. Photochemical oxidant injury and bark beetle (Coleoptera: Scolytidae) infestation of ponderosa pine. IV. Theory on the relationships between oxidant injury and bark beetle infestation. *Hilgardia* 39(6): 141-152.

Helms, J. A., F. W. Cobb, Jr., and H. S. Whitney
1971. Effect of infection by Verticicladiella wagnerii on the physiology of Pinus ponderosa. *Phytopath.* 61(8): 920-925.

REGION (DISTRICT) 1 - (and REGION 4)

NORTHERN ROCKY MOUNTAIN FOREST
AND RANGE EXPERIMENT STATION

INTERMOUNTAIN FOREST AND RANGE
EXPERIMENT STATION

The original cooperative agreement to begin forest disease research was between the Forester of Region 1 and the Bureau of Plant Industry. Over the years, however, there have been a number of changes, not only in personnel, but in Regional boundaries and the rise and fall and consolidation of Forest Research Stations, so a brief resume may be in order to clarify the current situation and how it evolved. Forest disease research is, of course, now an integral part of the Forest Service so pathologists work directly not just with their Station cohorts but with Regional personnel as well.

1911 - Priest River Forest Experiment Station was started near Priest River, Idaho to study timber management problems. It served all of Montana, Idaho north of the Salmon River, three Washington counties adjacent to Spokane, and Harding County in South Dakota.

1912 - Great Basin Experiment Station started at Ephraim, Utah, to study range and watershed problems. It served western half of Utah, nearly all of Nevada, California east of the Sierra Nevada crest, a large area in southeastern Oregon, and bits of Idaho and southwestern Wyoming.

1915 - Branch of Research authorized by the Forest Service.

1925 - Northern Rocky Mountain Forest and Range Experiment Station was established at Missoula, Montana, absorbing Priest River.

1930 - Intermountain Forest and Range Experiment Station started at Ogden, Utah, absorbing the Great Basin Station.

1948 - Inland Empire Research Center established in Spokane, Washington.

1953 - Intermountain and Northern Rocky Mountain Stations combined with headquarters at Ogden, Utah, under name of Intermountain Forest and Range Experiment Station. This Station thus serves the needs of Region 1 and 4 as now constituted.

1961 - Inland Empire Research Center phased out but research continued in separate projects in Spokane.

1961 - Forest Disease Laboratory at Moscow, Idaho, was established.

1963 - Forestry Sciences Laboratory at Moscow, Idaho.

* * * * *

Region 1 was the second region to which a Consulting Pathologist was assigned in accordance with the original agreement between the Forest Service and the Office of Forest Pathology. Dr. James W. Weir was selected for this assignment and in 1913 set up for business in Missoula, Montana, site of the District Forester's office.

Weir had been around quite a bit before he came to Missoula. After entering the University of Indiana he worked for a time with survey parties in Alabama and Tennessee helping to lay the groundwork for lands and plans that became parts of the Bureau of Forestry. Between these summer work sessions he attended Purdue University studying botany under Stanley Coulter and J. C. Arthur, among others. After he earned his Bachelor's degree from Indiana he taught chemistry for a couple of years at Culver Military Academy until 1909 when his itchy feet took him botanizing through Central Europe, studying French and German along the way. He entered the University of Munich that fall, studying under Goebel in botany, Tubeuf in forest pathology, and Hertwig in zoology. He received his doctoral degree in May 1911, having worked on a mycological problem for his dissertation.

When he returned to the USA he went to work for the still new Office of Investigations in Forest Pathology and was soon (1913) assigned to start the new office in Missoula. He and his assistant, E. E. Hubert, did a tremendous exploratory and research job over the next eight years in what was still, pathologically speaking, virgin territory. Dr. George G. Hedgcock from Washington headquarters had roamed that territory as early as 1910 and 1911 but not on permanent assignment. Among other problems, George had been studying the effects of fume damage on trees in the vicinity of Anaconda, Montana.

The reasons are now obscure but the Office of Forest Pathology was moved from Missoula to Spokane, Washington, probably early in 1919. Then the Spokane office was closed out completely July 1, 1921. This time it appears that personality conflicts^{1/} and disagreements as to who paid the rent were definitely involved. The same may have been true in Missoula. It does appear, however, that The Forester (Washington Office) objected to paying rent for pathology laboratory space when he thought other more important problems in the field were being neglected as a consequence. (The original agreement did state "The Forest Service shall furnish office room, furniture, and stenographic help (but no apparatus for technical work), for the consulting pathologist..."). No mention was made of laboratory space, let alone who was to pay for it.

But during those eight years Dr. Weir and his close associate, E. E. Hubert, published numerous papers, with the sometimes help of Annie Rathbun Gravatt and Arthur S. Rhoads. They covered a wide range of forest pathology and mycology, disease surveys, wood-rotting fungi, and life history studies of tree rusts and other forest fungi, and the dwarfmistletoes (then going by the technical name of Razoumofskya). Like Dr. Meinecke shortly before him in

^{1/} Weir was known to be what in those days would have been considered "a bit of a dandy," sporting a derby hat and carrying a cane though he had no physical defects!

Region 5, and Dr. Long who soon followed him in Region 3, Weir had almost uncanny ability quickly to put his finger on the key problems. He always maintained his interest in mycology and collected in person, and by exchange with others throughout the world, fungi in the family Polyporaceae.

When the Spokane laboratory was closed in 1921, Weir was reassigned to the Washington Office to write up his unpublished work. In 1923 he was transferred to take charge of the Bureau's intensive mycology collections. This work seriously interrupted the field trips he loved so well. But he did become a member that very year of a Federal expedition to the Amazon Valley to study rubber production possibilities. While down that way, he traveled extensively before coming back to the Washington Office.

In 1927 he was selected to head up the newly organized Rubber Research Institute of Malaysia with headquarters in Kuala Lumpur. After two years there, he went with the Goodyear rubber plantations in Sumatra on similar work. He returned to the States again in 1932 planning to resume his work with the Division of Forest Pathology but found that over these years his blood had already turned to latex so he went back to the tropics with the Ford Motor Company as agricultural advisor on their plantations along a major tributary of the Amazon. During this period he traveled back to the East Indies to select choicest stocks of high yielding clones of rubber trees, carefully budded and shipped with great care back to Brazil. (Shades of Captain Bligh!). He ended his services with Ford in March 1938, but continued his travels in South America working on rubber problems for various firms and governments until about 1941.

He died quietly in retirement on the old home farm near Scottsburg, Indiana, on June 1, 1943 and was buried there.

Ernest E. Hubert, a Montana State College student, was hired by Dr. Weir, presumably as a summer assistant at least as early as 1916 and perhaps even a year or two earlier. It also appears that as soon as Hubert received his Master's degree in 1918, Weir arranged for his permanent professional appointment. These two men worked together as a highly productive team until their office was disbanded in 1921, despite the nagging feeling that they really didn't get along too well personally. Knowing a little something about their contrasting personalities, this is not too hard to believe. But, true or not, it obviously in no way interfered with their work. The history of Weir while in the Inland Empire will serve equally well, professionally, for Hubert.

When the laboratory folded in Spokane, Hubert was transferred to the Forest Products Laboratory in Wisconsin. This move provided him with an opportunity to earn his doctoral degree at the University of Wisconsin in 1923 and in 1925 Dr. Hubert went West again to teach forest pathology and continue forest disease research at the University of Idaho where his previous travels and work experience with Dr. Weir proved invaluable.

When the Spokane laboratory was closed out on July 1, 1921 and Dr. Weir went back to Washington and Hubert to Madison, no one could possibly have foreseen that it would be 30 years before another Federal forest pathologist would be assigned to Region 1 and that it would be that same late date before the first one would be assigned to the territory of Region 4.

Sometime during this 30-year pathological drought, the name of Charles A. Wellner must be brought into the picture. This is as good a place as any, because since even before graduating from the University of Idaho in 1933 he had been closely associated with silviculture in the Northern Rocky and Intermountain areas (except for a year at Yale to earn his Masters in 1938 and to serve in the Navy from 1942 to 1946).

Chuck Wellner has been the one man in the Forest Service most responsible for holding the pieces together over all those years, recognizing the significance of diseases to timber management and possibilities for silvicultural control of blister rust and pole blight of western white pine and the dwarf mistletoes on most all other coniferous species in his area. He worked unceasingly for improved cooperation and increased funds to conduct the research on tree disease so badly needed. The gap left by closure of the Spokane office of forest pathology was intended to be filled, in part at least, by the pathologist from the Portland office in Region 6. But except for some white pine blister rust spread and damage studies in Idaho in the mid- to late-thirties, nothing much else ever happened. As early as 1942, Wellner had had Dr. Hutchins, then in charge of the Washington Office, and Drs. Bedwell and Childs from the Division of Forest Pathology in Portland and Dr. Wagener from San Francisco into the field to look at pole blight but failed to interest them in putting any effort into the problem.

What turned out to be known as pole blight had been seen rather commonly by the mid-thirties in the white pines of the Inland Empire by Roger Billings, then with the Forest Service, by Ken Davis, then silviculturist with the Northern Rocky Mountain Station, by the entomologist Jim Evenden, as well as by Chuck Wellner and others. Chuck himself did a bit of exploratory root excavation as early as 1938 but it was 1947 before he succeeded, with the help of others, in getting the University of Idaho to put a respectable effort on the problem. But it was 1949 before the Federal Government began serious research on the problem. But pole blight is another whole story, perhaps best told in considering Dr. Leaphart's contribution in the Inland Empire. Lack of support in seeking Federal dollars for research was perhaps the biggest problem. The Office of Blister Rust Control saw pole blight as a threat to their own impressive organization, thinking perhaps that Congress would say, why spend money on blister rust control if pole blight is going to kill the white pines anyway? One high placed blister rust expert, publicly trying to belittle the threat of pole blight compared to the actuality

of blister rust, likened the situation to the man who refused to take off his overshoes when he entered a house of ill-repute for fear he might catch athlete's foot.

Chuck opened the Inland Empire Research Center in Spokane, Washington, in September 1948 from whence much pole blight and other disease research has been done and served as Center Leader there until 1959 when he was replaced by R. Z. Callaham whose background training was in entomology and forest genetics. Since 1963 Mr. Wellner has been given responsibility for Forest Disease Research in the Intermountain Station either as Division Chief or as Assistant Director until just at the end of this year was named to direct the Station's first ecosystem research program being conducted by five of its work units, thus recognizing his intimate familiarity with local problems.

Roy Stillinger is another who might be mentioned here even though he never worked for the Office of Forest Pathology and it is difficult to know just where to fit him into the picture chronologically. After service in World War I, Roy spent essentially his entire professional career with the Office of Blister Rust Control, doing scouting, ecological studies, and other work closely relating to research. He lived most of his life in Moscow, Idaho, so cooperated very closely with the University of Idaho, especially on rust studies and mycological collections. He was equally cooperative with the Forest Service. Roy was involved in some of the earliest rust work in British Columbia and later became especially interested in the spread and intensification and damage to pines by white pine blister rust coming from only small groups of ribes. He was one of the first to recognize that in certain areas ribes eradication was futile as a blister rust control measure. He smoked a pipe, and as many kitchen matches, as George Hedgcock, but was never accused of starting any forest fires! He retired about 1950 and devoted his remaining years to managing his intensive

real estate holdings in Moscow. When he died in 1971 he left the University of Idaho its single biggest bequest to date (in size figures).

Richard T. Bingham didn't actually start work for the Division of Forest Disease Research until 1960, but his prior work experience with the Office of Blister Rust Control makes it appropriate to talk about him at this time in the sequence of personnel involved. Dick was another forest pathologist who served in the U. S. Marine Corps (1942-1945) and when he came back from the wars he went to work with the Development and Improvement Unit (D&I) of the Office of Blister Rust Control in their Spokane, Washington office along with Virgil Moss on the chemical control of ribes.

In 1949 Dick got started on damage studies in the pole stands of western white pine and could foresee the potential then for selection and breeding for resistance to white pine blister rust. When one clean tree is found standing in the midst of hundreds of its neighbors, all heavily diseased, it is easy to see how one's interest and curiosity would become aroused. By 1950 and 1951 there were forty or fifty men in the field looking for such trees, not necessarily doing only that. The first real genetic selection effort started in 1950. At that time, and until 1953, A. E. "Tony" Squillace was detailed as a summer assistant from Missoula to work with Dick on this. In 1953 Tony was transferred to the Spokane Research Center on genetic work and stayed there until transferred to Lake City, Florida, in 1957 to continue his genetics research, but on southern pines.

The first controlled pollinations were made in 1950 and the first progeny tests went in in 1953, the first inoculations being made by Kimmey in Spokane and Missoula, and later Bingham and Squillace did their own, assisted at times by Leaphart. By 1957 field outplantings of such stock showed about four trees with such obvious rust resistance that Bill Swingler, then Deputy Chief for State and

Private Forestry, saw to it that they promptly received about \$30,000 to build the North Idaho Forest Genetics Center at Moscow and really start breeding for rust resistance. That same year the University of Idaho donated about 40 acres of land near the campus for an arboretum and another 2-1/2 acres on another location closer in for a building site. Essential basic buildings were put up in 1957, and when completed in 1958, the breeding crew all moved from the old Spokane Center.

In the Departmental reorganization in 1953, Herman E. Swanson, head of the Blister Rust Control organization in Region 1, resisted all efforts to divest himself of the D&I unit and stayed in the Spokane Center, still under State and Private Forestry, but with only Moss and Bingham on that staff. A total of \$10,000 in BRC funds was transferred to the Intermountain Station, however, to begin research on white pine blister rust. Bingham was still with this unit when he first moved to Moscow but Moss never did leave either the D&I unit or Spokane until he retired. In 1960 the genetics unit went out of S&PF^{2/} and became part of the Intermountain Station working in Moscow, Idaho. This old unit and location continued to be called the North Idaho Forest Genetics Center, but since 1963, with additional greenhouse construction, has been part of the Forestry Sciences Laboratory, housing other Intermountain forest research projects as well.

Dick continues his outstanding work and has been a project leader at Moscow ever since moving down from Spokane. He really had two projects:

Resistance to blister rust in western white pine, with R. J. Hoff and G. I. McDonald on the professional staff, and

Breeding conifers for the northern Rocky Mountains with a professional crew of G. E. Rehfeldt and R. J. Steinhoff.

^{2/} From the Blister Rust Control annual report for calendar year 1960: "Effective August 21, 1961, all personnel, equipment, buildings, and other facilities of the Northern Idaho Forest Genetics Center (Spokane) were transferred from the Region to the Intermountain Forest and Range Experiment Station, Ogden, Utah (to Moscow, Idaho). That portion of the rust resistance pine project that is developmental will be financed by the Region."

These projects are now combined into one for Genetics and Rust Resistance of Northern Rocky Mountain Conifers.

Others who passed through those hallowed halls and moved on, though staying long enough to leave their imprint, were James W. Hanover and Burton W. Barnes.

1950 was a record year for the NRM-INT Station area because three forest pathologists were placed there on permanent assignment that year. By pure coincidence, a few weeks difference in reporting dates is all that determines their order for consideration.

Donald P. Graham reported March 1, 1950 as an Agent with the Division of Forest Pathology at the Inland Empire Research Center in Spokane, Washington, following temporary work at the Priest River Experimental Forest for the Portland office. His original assignment was to work on pole blight surveys, and although Chuck Wellner was Center Leader, Don's technical chain of command went through Ernie Wright in the Divisional office in Portland to Marvin Fowler in the Washington Office. John Staley worked with Don as a summer assistant in 1950 and 1951. There had been some feasibility exploratory work a year or two earlier by Marvin Fowler from the Washington Office, and Lake Gill from the Southwest.

The pole blight survey was really the first planned and organized aerial detection program of a forest disease ever undertaken in the United States. Dwarfmistletoe surveys by Graham and Hawksworth were also "firsts" among disease surveys of a problem covering vast geographic areas and a number of hosts. Don spent full time on surveys and damage appraisals through 1954, and again when an organized resurvey was instituted in 1958. In the 1953 Department reorganization Don was assigned to the Northern Rocky Mountain Station but remained in Spokane even after the NRM-INT merger in 1953 on this type of work until July 1961, when the responsibilities for surveys and evaluations were transferred from the Stations to the Regions. Then Don moved to Region 6 and the branch of Insect and Disease

Control in TM under Ben Howard, as principal staff pathologist. In March 1967 he moved on up to the Washington Office in the Division of Forest Pest Control where he is still concerned with disease (and insect) detection.

In May 1950, James L. Mielke was moved to Logan, Utah, though reporting to Dr. Wagener in San Francisco, thus becoming the first Federal forest pathologist ever permanently assigned to the Intermountain Station territory by the Division of Forest Pathology. Jim was headquartered in the Forestry School on the campus of Utah State University. Just prior to moving to Logan, Jim had been at Albuquerque for a few years, also under Wagener's supervision, while others on the regular staff there were in military service. In his new territorial assignment to the Intermountain Station, Jim's major role was to determine what significant disease problems were present in Region 4. Some time was spent on twig blight of ponderosa pine and during the course of these observations he found Fomes annosus to be widespread in that tree species. Progress was made in laying the groundwork for later detailed research by Drs. Peterson and Krebill on Cronartium stalactiforme, yellow witches broom of alpine fir, gall rust of Pinus ponderosa, and Cronartium comandra on Pinus contorta.

During the 1953 reorganization, Jim, of course, became a member of the Forest Service in the Division of Forest Disease Research and reported to Kimmey when he transferred into the Intermountain Station in 1957. Before retiring in 1961 to his home in Logan, Jim got in several good licks on the dwarfmistletoes as well as the works cited in the preceding paragraph. Perhaps slowed down just a little bit now, Jim still enjoys his lifelong hobbies of hunting and fishing.

Charles D. Leaphart was assigned by the Division of Forest Pathology on June 6, 1950, specifically to start research on pole blight of western white pine. He was physically headquartered in Missoula, Montana, though he officially reported to Lake Gill in Albuquerque. The persistence of Chuck Wellner had finally

paid off! With the impetus given by him the professional challenge offered by the University of Idaho, the preliminary look by Gill and Andrews from Albuquerque in 1948, and the aerial surveys and ground checks conducted by Fowler out of the Washington Office and Ernie Wright from PNW and Don Graham from the Spokane Research Center, the size and importance of the pole blight problem were finally realized by top Federal Officials and enough money added to the pot to start serious business.

Leaphart continued on with the Division on his pole blight research until the Departmental reorganization when on December 18, 1953 he joined the Forest Service but remained in Missoula. In August 1954 he moved to the Inland Empire Research Center at Spokane. There he stayed, still working on pole blight, dwarf-mistletoe, and other problems until June 26, 1960 when he was transferred from the Intermountain to the Central States Station at Delaware, Ohio.

Don began to study his assigned hardwood heartrot problem there by first reviewing the background material already available. He soon found what everyone really knew--that if fire was kept out, cattle prevented from grazing in the woodlands, and already known proper practices in making coppice cuttings were followed, 90 percent of the decay problem could be resolved. So, why spend more money doing research on 10 percent of a problem when nothing was being done about correcting the already known 90 percent? This line of sound reasoning shook up some folks, but that and other things got him transferred back to the Intermountain Station in October 1962 as Assistant Chief in Forest Disease Research under Kimmey and later Wellner with headquarters in Odgen, Utah. In March 1965 he was moved once again, this time to the Forestry Sciences Laboratory at Moscow, Idaho, to work again under Kimmey on chemical control of white pine blister rust research.

In the meantime Copeland and others had been added to the Intermountain pole blight crew and in 1949 the Candian government had added A. K. Parker to their

staff of pathologists to work on this same problem in British Columbia. Through the combined cooperative and coordinated efforts of all parties concerned, work was finally closed out about 1958 except for the tag ends of long-term studies already installed. Work was closed out because the firm conclusion had been reached that pole blight was no longer a threat to western white pine, that it was not spreading because it was a non-infectious disease caused principally by a peculiar set of climatic and edaphic factors which, hopefully, may never occur again. (See Leaphart's Journal of Forestry article of 1958.)

In July 1969, Leaphart was again promoted without change of headquarters and made Project Leader of Diseases of Western White Pine and Associated Species with a technical staff consisting of Wicker, Harvey, Martin, Hungerford, and their indispensable histological laboratory technician, Mr. Woo. There is no longer any active research on pole blight; efforts have shifted back to certain aspects of white pine blister rust and the dwarfmistletoes.

Otis L. Copeland was the next man added to the staff specifically to conduct research on pole blight. In April 1954 Otis was transferred from the Calhoun Experimental Forest at Union, South Carolina to the Inland Empire Research Center in Spokane. He was basically a soil scientist and had been working on that aspect of the littleleaf disease of shortleaf pine since September 1947 except for time out for graduate study and a 4-year hitch in the Army. (As it turned out, there are a number of basic similarities between littleleaf and pole blight.)

While working out of Spokane, Otis conducted extensive soil studies throughout the Inland Empire seeking to find basic differences between the soil of healthy and pole blight infected white pine sites. At the same time Leaphart was conducting pathological studies, dealing principally with rootlet mortality and associated pathogens. Along with their joint studies of seedling development in specially prepared soil beds, they clearly established that undesirable or adverse soil

conditions certainly are predisposing agents that set the stage for attacks or invasions by pathogens that subsequently can wreak havoc with forest trees.

By June 1957 Otis figured he had dug enough soil pits over the South and West in the last ten years to meet his quota and at that time was moved to Ogden, Utah. He moved on and up from there to become Assistant Director for Forest Fire and Watershed Management Research on July 5, 1965. He has had no direct involvement with forest disease research since that time and is now Assistant Director for Planning and Application at the Intermountain Station.

Merle G. Lloyd, a meteorologist, was recruited from the Weather Bureau in 1956 to study the relationship of blister rust infection to climatic conditions, working at the Inland Empire Research Center, Spokane. The increasing amount of rust infection in western white pine stands despite ribes eradication had caused a number of people to become concerned about possible long-distance spread of the rust. Merle worked on this problem at the Inland Empire Research Center and made a number of significant findings. He dramatically demonstrated by the use of smoke plumes and in other ways that sporidia of white pine blister rust could travel and infect in special situations much further than the 900 feet traditionally relied on for protecting pine stands.

Merle transferred back to the Weather Bureau as a forecaster in Salt Lake City in 1962. He later transferred to San Francisco because the weather in Salt Lake City didn't agree with him, but all in vain for he died of a heart attack in San Francisco on June 1, 1965.

James W. Kimmey was transferred from the Pacific Southwest Station to Ogden, Utah, in 1957 to become Division Chief for Forest Disease Research in the Intermountain Station. Jim Mielke had been located in Logan, Utah, since 1950, but even so, Jim Kimmey became but the second forest pathologist ever permanently assigned to the Intermountain Station. While in Ogden, Kimmey had little opportunity to become really involved in personal research but did work a little with Dr. Mielke on dwarfmistletoes and native rusts.

In 1963 Dr. Kimmey was moved to Moscow, Idaho as Project Leader of the Diseases of the White Pine Type and Antibiotic Research. His personal studies were first on the effect of antibiotics on rust infected white pine trees and with the help of OBRC personnel he installed two large study areas near Pierce, Idaho on which to make detailed observations. He installed a second large study area near St. Maries, Idaho on which to observe the activity of Tuberculina maxima and then carried on a region-wide survey. He became more and more interested in this long known hyperparasite of rust cankers, Tuberculina maxima, and was convinced that actidione treatment being used for the control of white pine blister rust on trees was killing the hyperparasite but not the fungus responsible for the rust. This was one of the factors confusing this promising control method, but Jim had to wait until retirement to get his views published.

Jim retired at the end of December 1965 after having built up his Division from four men with essentially no space or equipment to two fully equipped laboratories manned with 13 professionals, 8 subprofessionals, and adequate supporting staff. Still young enough to enjoy life, he and his good wife, Hazel, moved to Westport, Washington where they built a lovely home. Looking one way, they view the Pacific Ocean, the other, Gray's Harbor. What more could be asked for by those who enjoy hunting, fishing, crabbing, clamming, and beachcombing?

Ed Wicker entered the Division of Forest Disease Research by doing as so many others had before him, i.e., serving as a summer assistant, in his case, 1957, 1958, and 1959. He was located at the Inland Empire Research Center in Spokane assisting on a variety of problems; microclimatic aspects of white pine blister rust, dwarfmistletoes, and needle cast fungi. After completing his Bachelor's degree he received his permanent appointment as a Research Forester but still headquartered in Spokane working on pole blight, foliage diseases of conifers, and dwarfmistletoes. He was on leave periodically, even after moving

to Moscow, Idaho until he completed his graduate work at Washington State.

By June 21, 1963 he was up to GS-11 and working under Jim Kimmey in Moscow but still in the same general area of research. When Kimmey retired in 1965, Ed then reported to Don Leaphart, continuing to work on Tuberculina maxima, and the biology of dwarfmistletoe on larch, Douglas-fir, and lodgepole pine. It was also in 1965 that he completed his Ph.D. program doing his thesis on "Biology and Control of Dwarfmistletoes on Douglas-fir and Western Larch." During these graduate years Ed discovered that he and his major professor at WSU, Dr. C. G. Shaw, shared two mutual interests; forest pathology and big game hunting. This mutual interest and cooperation continues to this day on both aspects even though the big game hunting does include the prong horned antelope, the meat of which even sheep herders know doesn't make fit coyote bait!

Ed has continued to accept increased responsibility and is now Dr. Leaphart's right hand man. His main interests and activities are centered around dwarfmistletoes and the possibilities for the biological control of white pine blister rust. From July 1970 to June 1971, Ed was on detail abroad where he studied white pine blister rust, and its fungal and bacterial parasites, on white pines and ribes in 27 European and Scandanavian countries. The cultures he brought back will be tested on native strains of the rust in the West.

Orson K. Miller joined the disease project, first at Ogden, Utah, than at Moscow, Idaho, in 1961, working mostly at his specialty of forest mycology. He stayed only until 1965, however, when he moved on to the Forest Disease Laboratory at Laurel, Maryland, where he could devote full time and attention to pure mycology. About the time this laboratory was moved to the Forest Products Laboratory at Madison, Wisconsin, Orson resigned to accept appointment in 1970 on the faculty of Virginia Polytechnic Institute and State University at Blacksburg where he is still active in his chosen field.

Raymond J. Hoff first joined the staff in Moscow, Idaho, as a Biological Aid in May 1962. Fourteen months later he made the professional ranks as a Plant Geneticist and has been rising steadily in both grade and responsibility until he is now doing independent research on basic aspects of blister rust resistance in western white pine as a Research Plant Pathologist in Dick Bingham's project. He has earned his doctoral degree at WSU in the meantime so obviously a good deal of his time and energies to date have been diverted in that direction.

Jerome W. Koenigs transferred from the Southern Station in May 1961 to the Inland Empire Research Center, Spokane, Washington, then moved on down to the Forestry Sciences Laboratory in Moscow, Idaho, when the shift was made soon thereafter. Jerry worked on a decadence in western redcedar that turned out to be root rot problem not unrelated to site deterioration because of too drastic release during cutting practices. As so many have done, Jerry earned his doctoral degree while in Moscow studying under Dr. Shaw at WSU, working on a problem of blister rust infected white pine which involved some tissue culture work. A good share of the latter work was done in the Forestry Sciences Laboratory.

Jerry left Moscow in February (a good month in which to leave Moscow) 1966, again by transfer, this time to the Forestry Sciences Laboratory at Research Triangle Park, North Carolina, where he continues his enzyme research in relation to tree diseases. But Jerry left his mark on the Inland Empire during his five short years there through his studies involved in attempting to culture white pine tissue and thereon the blister rust fungus so that various antibiotics and other chemicals might be tested for toxicity to both host and parasite in culture. His tissue culture work provided impetus to Dr. Harvey's research which resulted in axenic culture of Cronartium ribicola. Jerry put in a study of the effectiveness (or lack thereof) of certain antibiotics in controlling Cronartium comandra on lodgepole pine. More importantly, working with Drs.

Kimney and Wicker, they were able to examine some of the field plots established by the Office of Blister Rust Control from which the preliminary conclusion had been drawn that these antibiotics seemed to be effective in controlling blister rust on western white pine trees. To double check, the Station put in plots of their own at Pierce, Idaho. Between the two approaches, they were able to convince OBRC personnel of what they were already beginning to suspect, that the antibiotic really wasn't doing the job after all. As it turned out, much of the OBRC interpretations were confused by the fact that, by coincidence, their treated plots were in areas heavily infested with Tuberculina maxima, while their check plots, such as they had, were only lightly so. The difference could really have been solely the response to T. maxima.

Rogert S. Peterson was transferred from Fort Collins in Rocky Mountain territory to Logan, Utah, in INT territory in April 1962. Mielke had retired the year before, leaving the position in Logan vacant and Roger was finally talked into accepting this new assignment as Project Leader to continue his studies of the native rusts of western conifers. And he did have to be talked into it because he had a yen to go into teaching (perhaps his teaching fellowship at Michigan gave him the bug) instead of following research. He agreed, however, that if he did accept the position at Logan, he would stick with it for five years. For all practical purposes he kept his promise because it was not until August 1966 that he left for a position as tutor at St. John's College, Santa Fe, New Mexico. It was only three or four months after moving to Logan that Roger was provided a most capable assistant, and as a pair they did an outstanding job of expanding on Mielke's work and straightening out the taxonomy, host relations, and life cycle of the western conifer rusts which had really been confused prior to their work.

After his first academic year at St. John's Roger spent the summer as a Research Fellow at Purdue University, but returned to St. John's that fall where

he is now Tutor and Head of Biology. During the summer of 1968 he returned for six weeks' temporary work to study limb rusts of pines in Mexico. His routine is now to teach "great books" at St. John's during the winter and study tree rusts in the summers. Lately he has been specializing in rusts of juniper and cypress in the southwestern United States and Mexico.

Richard G. Krebill joined Dr. Peterson in Logan on July 10, 1962 to assist him in his rust research. Dick had had a little prior field experience working as a summer aid under Kimmey and Bynum on the California Forest Disease Survey. Dr. Krebill had the benefit of over four years' training and guidance under Dr. Peterson before Roger left the Forest Service. Dick was thus very well qualified to succeed him as Project Leader in 1966. He has continued and accelerated the rust research since, being able to gain additional assistance, even though some of it on a temporary or part-time basis. Like Mielke and Peterson before him, Krebill had his office in the Forestry School on campus until the Forestry Sciences Laboratory was built by the Forest Service in 1964. In 1970 the Native Rusts of Western Conifers project was expanded to include disease problems of shrubs and trees important to big game and recreation. In 1972 it was included in a new Research Work Unit for shrub improvement at Provo, Utah.

In 1967 D. L. Nelson was added to the project to work on the life cycle of limb rust fungi, and J. A. Christenson, a graduate student at Utah State University, was employed that same year on a short term assignment to study the albino western gall rust fungus. In 1968 Joyce M. Muir joined the permanent staff on a half-time basis as a laboratory technician.

The mission of this project, which really started with Dr. Mielke in May 1950, is still to determine the identity and taxonomic relations of the native rust fungi of western conifers and diseases of woody plants on game ranges and recreational areas, to work out their life histories and host relations, to

determine their rate of spread and damage, and to develop biologically sound and economically practical measures for their prevention and control.

Gerald I. McDonald was first appointed as a forest geneticist and assigned to the Moscow laboratory in June 1964 to work on Dick Bingham's resistance to blister rust in western white pine project. He is now a Research Plant Pathologist working on the same problem that was his dissertation for his Ph.D. degree which he received at WSU in 1969, namely, "Resistance to Cronartium ribicola J. C. Fisch. ex Rabenh. in Pinus monticola Dougl. seedlings." Obviously, Gerald has been too involved in graduate study up to this point to have done much else. Since he began working with Dr. Hoff, to dig into blister rust resistance reactions and genes in the P. monticola: C. ribicola couplet, however, the publications have poured out. Together, they have presented evidence for existence of at least two races of C. ribicola and more than four resistant genes in P. monticola.

Alan E. Harvey is another of those young scientists who have been serving their apprenticeship at the Forestry Sciences Laboratory at Moscow, Idaho while studying for their advanced degree at Washington State University, nine miles away across the state line in Pullman, Washington. His doctoral dissertation was concerned with the Isolation, Identification, Purification, and Biological Properties of the Antibiotic Phytoactin.

Alan was appointed as Research Plant Pathologist on June 14, 1965, and assigned to Jim Kimmey's project on diseases of western white pine and associated species. He has been working very closely ever since with Dr. Shaw and others on the WSU campus on a computerized literature retrieval system, specifically designed for the chemical control aspects of white pine blister rust. The excellence of his work in following Koenig's lead and perfecting axenic culture of C. ribicola has merited two successive promotions.

Neil E. Martin is another "work in Moscow and study in Pullman" on-the-job trainee who was first appointed Research Plant Pathologists in June 1966.

He is assigned to Leaphart's project to work on the biochemistry of host-parasite interactions in the blister rust disease of five needle pines. He has since received one promotion with no change in assignment though he has spent considerable time in graduate study.

Roger D. Hungerford is the most recent member of the Forest Disease Research crew at the Moscow Laboratory. He was appointed a GS-7 Research Forester on Dr. Leaphart's project in June 1966. He was promoted to GS-9 in July 1967 where he still remains pending commencement of graduate study. He has been working across the board as subaltern to the senior scientists. He does have plans to start a Ph.D. program this winter, skipping the Master's step in the process. He intends to be different than many of the rest of the staff for he will study under Dr. Arthur Partridge at the University of Idaho right there in Moscow. There could be some paternal influence here for Roger is the son of Professor Kenneth Hungerford of the University of Idaho College of Forestry, Wildlife, and Range Science, and the grandson of the late Dr. C. W. Hungerford who for 20 years was head of the Plant Pathology Department of Idaho, followed by another 20 years of service to the University as Dean of the Graduate School.

The most recent addition to the Intermountain Station's staff of forest pathologists is David L. Nelson. He was appointed in late 1967 to assist Dr. Krebill on his rust project in Logan, Utah. Dr. Nelson is still at the same location, on the same assignment, but has taken some time off in the interim to earn his doctoral degree at the University of California.

In summary, the Intermountain Station's territory is now served by forest pathologists headquartered in but two locations working on a wide variety of disease problems:

Logan, Utah	(1 project, 2 scientists)
Moscow, Idaho	(2 projects, 8 scientists)

The vast majority of these men are in the younger age classes, relatively fresh from graduate study, so are in a favorable position to make significant research advances in a field already well worked over. Fortunately, there is still enough admixture of age and experience on the staff to assure proper direction to their efforts.

APPENDIX

Weir, James Robert

A.B. (Bot.) University of Indiana 1907
Ph.D. (For.Path.) University of Munich 1911

Publications: (See also Hubert, E. E. for they worked very closely together)

Weir, James R.

1913. Destructive effects of Trametes pini and Echinodontium tinctorium.
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1926. A pathological survey of the Para rubber tree (Hevea brasiliensis) in the Amazon Valley. USDA Bull. 1380.

Hubert, Ernest E. (See University of Idaho)

- B.S. (For.) Montana State College 1912
M.S. (For.) Montana State College 1918

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1919. Pathological marking rules for Idaho and Montana. Jour. For. 17: 666-681.

Wellner, Charles A.

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M.F. Yale University 1938

Publications:

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Wellner, C. A.

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Ketcham, David E., Charles A. Wellner and Samuel S. Evans, Jr.

1968. Western white pine management programs realigned in northern Rocky Mountain national forests. Jour. For. 66: 329-332.

Stillinger, C. R.

B.A. University of Idaho 1913

M.S. University of Idaho 1915

— University of Washington 1915-1916

— Oregon Agricultural College 1916-1917

Publications:

Stillinger, C. R.

1944. Notes on Cronartium occidentale. Northwest Sci. 18: 11-16.

Bingham, Richard T.

B.S. (For.) University of Idaho 1940

M.S. (For. Path.) University of Idaho 1943

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Publications:

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M.S. Yale University 1949
Ph.D. Yale University 1950

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1966. Explanation of pole blight from responses of seedlings grown in modified environments. Can. J. Bot. 44: 121-127.

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B.S. Clemson College 1938

M.S. Pennsylvania State College 1941

Ph.D. Pennsylvania State College 1955

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Miller, Orson K.

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| B.S. | (For.) University of Massachusetts | 1952 |
| M.F. | University of Michigan | 1957 |
| Ph.D. | University of Michigan | 1964 |

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Hoff, Raymond J.

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| B.A. | (Biol.) Western Washington State College | 1957 |
| Ph.D. | (Bot.) Washington State University | 1968 |

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B.S. (For.) University of Minnesota 1954
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Ph.D. (Pl.Path.) Washington State University 1968

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Harvey, Alan E. and J. L. Grasham

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Nelson, David L.

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Ph.D. (Pl.Path.) University of California (Berkeley) 1971

Publications:

Nelson, David L. and R. G. Krebill

1970. Effects of Chrysomyxa pirolata cone rust on dispersal and viability of Picea pungens seeds. (Abstr.) *Phytopath.* 60: 1305.

Kreibill, R. G. and D. L. Nelson

1970. Nuclei of Jeffrey pine limb rust *Peridermia*. *Mycologia* 62: 996-1002.

UNIVERSITY OF IDAHO

Dr. Henry Schmitz, who had just completed his Ph.D. in Plant Pathology at Washington University (St. Louis), where forest pathology research in America all started 20 years earlier, was hired in 1919 by Dean F. G. Miller of the Department of Forestry at the University of Idaho as Assistant Professor of Forest Pathology. He thus became the first professor in a western university to be given full faculty recognition in this relatively new field of forestry science. Dr. Schmitz specialized in products pathology but left Idaho in 1925 to move onward and upward, eventually to become Dean of the College of Agriculture, Forestry, and Home Economics at the University of Minnesota, and ultimately, President of the University of Washington, his alma mater.

Schmitz started a dynasty of teaching and research in forest pathology at Idaho just six years after the U. S. Department of Agriculture had assigned Dr. James R. Weir to establish a branch of the Office of Investigations in Forest Pathology at Missoula, Montana, and one year before Dr. John S. Boyce was assigned to open a similar office in Portland, Oregon, a dynasty which has endured to this day with significant contributions in research and the training of professional forest pathologists.

Dr. Ernest E. Hubert, formerly field assistant to Dr. Weir, headquartered in Missoula, Montana, and later in Spokane, Washington, and more recently Assistant Pathologist at the Forest Products Laboratory, Madison, Wisconsin, assumed the chair of Professor of Forest Pathology at Idaho following Schmitz' resignation in 1925. He held this post until 1935 when he resigned to go with the Western Pine Association in Portland, Oregon, where he did pioneering research on wood preservatives, working especially with pentachlorophenol which some folks still give him credit for having discovered. He later (1943) went with I. F. Laucks, a subsidiary of Monsanto Chemical Company in a similar capacity.

While at Idaho, "Doc" Hubert, as he was affectionately called by his students, conducted research on forest and forest products pathology and was especially active in cooperation with the Federal Government in the study and control of white pine blister rust. He also was very much interested in and concerned over the obvious effects of smelter fumes on trees and other vegetation. Although Doc's primary interest was products pathology, he did author in 1931 the first American textbook on forest pathology. This pioneering effort was both acclaimed and criticized, as are most all "first" efforts, but 40 years later, many prominent pathologists still use it as a valued reference book. Dr. Hubert was a meticulous worker, both in the laboratory and in the field, and was most exacting with the students who were studying under him or who were working for him.

Doc became such an authority on western Indian lore and culture that in August 1934 he was invited by the Park Naturalist to come to Glacier National Park to assist in coaching the Indians in a ceremonial dance to be given on the shores of Two-Medicine Lake for visiting President Roosevelt. On New Year's Eve he attended the annual ceremonial dance of the Nez Perce Indians at Lapwai, Idaho, and was formally adopted by Chief Many Wounds as a member of the tribe under his grandfather's name, Ha-hats Ilpilp, or Red Bear. Doc built up an extensive collection of Indian relics and became proficient in giving lectures on Indian lore, accompanying his spoken talk with entertaining, but nevertheless, authentic Indian sign language. His interest in archery led to what may well have been the invention of "archery golf" where bows and arrows replaced the more conventional clubs and balls.

Dr. Hubert returned to his old haunts in forest pathology at Idaho in 1951 and directed the University's program of pole blight research until his death in the spring of 1954. Many, many competent forest pathologists who studied under Doc as undergraduate or graduate students continue as leaders in the field as living memorials to him. His last graduate student was Charles E. Hodges,

Jr., who went on to the University of Georgia for his doctoral degree and is now a world authority on Fomes annosus with the U. S. Forest Service at Research Triangle Park, North Carolina.

Dr. John Ehrlich succeeded Doc Hubert when he left Idaho in 1935 to work for the Western Pine Association. Ehrlich came to Idaho with an exceptionally strong background in microbiology and mycology having supplemented his excellent academic training with two years as a fellow at the Imperial Mycological Institute in Kew followed by another year at the Royal Botanical Gardens. It was quite a transition for an Ivy Leaguer fresh from the cloistered towers to the woods of Idaho, but to John's everlasting credit, it must be said it was an essentially successful one. John was a strict grammarian (his Harvard or his British training?), basically interested in microbiology and mycology. Fortunately, however, he was responsive to Forest Service needs for research on root diseases of western white pine though opposed to having the U. S. Division of Forest Pathology become involved also in research on the problem. With one of his graduate students, Loren Baker, working with him, they did some early field studies on what eventually came to be known as pole blight of western white pine. During World War II, Ehrlich succumbed to the lure of big business and in 1944 he went with the Parke Davis Company where he could more fully utilize his exceptional talents and became intimately involved in their stepped-up programs of mass production of antibiotics. Current information suggests that he is still there. Baker was less fortunate; he went into the Navy and lost his life in action, thus terminating a promising brilliant career as a forest disease research scientist.

A. W. Slipp covered forest pathology at Idaho during the war years between Ehrlich's departure in 1944 and the premanent appointment of a successor in 1947. "Whiz" had been a fixture on the campus for many years, arriving first as a graduate student about 1936 or 1937 and remaining on after obtaining his master's

degree as a Research Associate until his death in December 1959. Research and teaching were both at a low ebb during this war period but Slipp did keep up his blister rust canker growth and development studies which started when he first arrived on campus and were concluded in about 1952. This work had been supported throughout, in part, by the Office of Blister Rust Control, USDA. Whiz also extensively revised and updated the forest laboratory manual developed by Ehrlich for use at Idaho during this period.

Whiz again filled in most capably between permanent appointees during the interim period July 1951 to October 1954, teaching the undergraduate course in forest pathology, continuing his own blister rust research and his mycological collections. Whiz became an authority on the Boletes of the Northwest. He cooperated closely with C. R. Stillinger of the Office of Blister Rust Control in his mycological endeavors. His herbarium eventually went to Washington State University.

Whiz was still on the Idaho faculty and an active forest pathologist at the time of his death. He refused to allow his physical handicaps to prevent his pursuit of his chosen profession. Not all persons were aware that he had already lost a lung to T.B. before he arrived at Idaho, that he had a long list of allergies, that he was a diabetic, and suffered a heart condition that was his eventual demise.

Dr. Thomas S. Buchanan was appointed Associated Professor Forest Pathology in August 1947, coming to Idaho from the Development Department of Weyerhaeuser Timber Company, Longview, Washington. "T.S." immediately took over the teaching of Forest Pathology, reviving the long-dormant course in Products Pathology, initiated a new course in Research Methods, and inherited from the Dean responsibility for Cost Control in the Logging Industry.

Perhaps most importantly, he took charge of the University's program of research on pole blight. Through the continued efforts of Charles A. Wellner, USFS, the University and the Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana, had finally gotten together and through their combined efforts, Dr. Don S. Welch, Professor of Forest Pathology at Cornell, was induced to come to Idaho in June 1947 to spend his sabbatical leave on pole blight research. Buchanan thus had the advantage of his prior experience for several months before Don returned to Cornell in January 1948. The pole blight crew was gradually enlarged, first in 1948 with the addition of George M. Harvey and Dr. William K. Ferrell. George continued on pole blight research until February 1950 when he left for Forest Service research at Gulfport, Mississippi. Bill continued his study of the physiology of pole blighted and healthy western pine using radio-isotope techniques until 1953. He remained on the Idaho faculty, however, in other research and teaching positions until moving on to the Soils Department at Oregon State University in 1956. Dr. E. E. Hubert was assigned to pole blight research when he returned to the University in 1951. Fred D. Johnson, who worked with Dr. Ferrell in the radio-isotope laboratory, is still on the Idaho faculty in forest management. Among the temporary or summer assistants on the pole blight crew were T. F. Giles, Frank G. Hawksworth, H. H. Bynum, and C. S. Hodges, Jr.

Most of the field research was done in close cooperation with the U. S. Forest Service, especially on the Kaniksu, Coeur d'Alene, St. Joe, and Clearwater National Forests in Idaho. Deception Creek Experimental Forest became temporary field headquarters, and sleeping facilities, office, and cooking space were provided. Mrs. George Harvey was lured into serving as camp cook one summer.

Realizing that no one agency was properly equipped, with either finances or personnel, to assume the entire burden of research, a field meeting was called

at the Deception Creek Experimental Forest (Coeur d'Alene National Forest, Idaho) for June 1 and 2, 1948. This prompted the USDA, BPI, Division of Forest Pathology to send Dr. Lake S. Gill, Dr. S. R. Andrews, and technician Pete Mellenbaugh from Albuquerque, New Mexico, as their representative. This meeting stimulated that Federal agency to accept their rightful responsibility to initiate a research program of their own, fully coordinated with other interested and concerned agencies.

Dr. C. Gardner Shaw had arrived on the adjacent Washington State College campus to teach Forest Pathology about the same time Dr. Buchanan arrived at Idaho. These ex-Marine officers soon got acquainted and launched a number of cooperative efforts. First, they stirred up local interest on both campuses and succeeded in having chartered the Palouse Detachment of the Marine Corps League, Buck becoming its first Commandant.

Their combined efforts also led to an international meeting of those concerned with pole blight, held at Nakusp, B. C., in the summer of 1948. This meeting was the precursor of the Western International Forest Disease Work Conference which has since been held annually starting in 1953 at Victoria, B. C.

Dr. Buchanan left Idaho in June 1951 on a Foreign Agricultural Service assignment to Liberia. His last official act at Idaho was to conduct another of his pole blight recognition and training schools at the Priest River Experimental Forest (Kaniksu National Forest, Idaho). Jim Evenden, renowned forest entomologist from Coeur d'Alene, took him by car from Priest River to Spokane, Washington, to catch his train east to start his African venture.

After Buchanan left in June 1951, and until his replacement was selected, Mr. Slipp once again handled the course work in forest pathology and Doc Hubert taught products pathology, supervised graduate students, and directed pole blight research.

Dr. Robert Gilbertson was appointed on October 1, 1954, and took charge of the forest pathology program and taught other forestry courses as well. Bob had a brand new Ph.D. in his pocket and a background of botany and plant pathology, with a strong interest in mycology, especially wood decay fungi. But he had been raised in Missoula, Montana, so was no stranger to the hills and forests of that area. Gil continued with certain aspects of the pole blight program but work slacked off as the old crew scattered and as Federal agencies gradually assumed more and more of the total responsibility. When an offer came from Syracuse in August 1959, Gil accepted so he could devote more time to his first love--fungal taxonomy. He stayed at Syracuse until July 1967 when he went West again, this time to the University of Arizona where he still teaches.

Dr. Arthur D. Partridge was chosen to replace Dr. Gilbertson, coming on campus in 1960 from his position as forest pathologist with the U. S. Forest Service in Columbia, Missouri. He is still there 12 years later, already having served continuously longer than any incumbent since the position was first established in 1919. Art has a primary interest in the decays of Inland Empire trees. He has vastly improved quarters and facilities in the new building housing the College of Forestry, Wildlife, and Range Science and is now equipped to give top flight graduate training.

APPENDIX

Schmitz, Henry

B.S.	University of Washington (Seattle)	1915
M.S.	University of Washington (Seattle)	1916
Ph.D.	(Pl.Path.) Washington University (St. Louis)	1919
D.S.	(Honorary) University of Alaska	1954

Students:

Jesse L. Bedwell

Publications:

Schmitz, H. and A. S. Daniels

1921. Laboratory tests on the relative durability of some western coniferous woods with particular reference to those growing in Idaho. Univ. of Idaho, School of Forestry. Bull. No. 1, 1-11.

1923. Leaf cast of Larix occidentalis by Hypodermella laricis Tubeuf in North Idaho. Phytopath. 13: 505-506, illus.

1923. The wood destroying properties of Polyporus volvatus. Jour. For. 21: 1-2.

Hubert, Ernest E.

B.S.	(For.) Montana State College	1912
M.S.	(Bot.) Montana State College	1918
Ph.D.	University of Wisconsin	1923

Students:

A. B. Hatch	C. A. Wellner
R. K. Pierson	V. E. Moss
D. R. Miller	S. B. Silverborg
T. H. Harris	R. J. Campana
T. S. Buchanan	H. H. Bynum
	C. S. Hodges, Jr.

Hubert, E. E.

1927. The care of windows and doors. The Timberman 28: 60-62.

1927. Manual of wood rots. Field Manual, pp. 1-65, illus. The Timberman, Portland.

1928. Relation of forest management to the control of white pine blister rust. Jour. For. 26: 892-898.

1929. The cause and control of decay in buildings. Univ. of Idaho Bull. No. 2 of Vol. 29. January.

1929. The sap stains of wood and their prevention. U. S. Dept. Commer., Wood Util. Bull., pp. 1-27.

1931. An outline of forest pathology. John Wiley & Sons, New York, vii + 543 pp., illus.

1935. Observations on Tuberculina maxima, a parasite of Cronartium ribicola. Phytopath. 25: 253-261.

Ehrlich, John

B.S.	Cornell University	1928
A.M.	Duke University	1929
S.M.	Harvard University	1930
Ph.D.	Harvard University	1933

Students:

A. W. Slipp	L. M. Paine
R. F. Patton	L. K. Baker
R. T. Bingham	R. S. Opie

Publications:

Ehrlich, John

1949. A preliminary study of root diseases in western white pine. North. Rocky Mtn. Forest & Range Exp. Sta. Pap. No. 1, 10 pp. October.

Ehrlich, John and Loren K. Baker

1939. Preliminary study of dying of young white pine on Coeur d'Alene and Kaniksu Forests. Univ. of Idaho, School of Forestry, 50 pp., typewritten.

and Robert S. Opie

1940. Mycelial extent beyond blister rust cankers on Pinus monticola. Phytopathology 30: 611-620.

1941. Etiological terminology. Chron. Botanica 6: 248-249.

Slipp, A. W.

B.S. (For.) University of New Brunswick 1930

Graduate work at Harvard and at Emory

M.S. (For.) University of Idaho 1939

Students:

Thomas H. Laurent

Publications:

Slipp, Albert W. and Walter H. Snell

1944. Taxonomic-ecologic studies of the Boletaceae in northern Idaho and adjacent Washington. Lloydia 7: 1-66, illus. March.

1951. Growth rate of cankers of white pine blister rust along branch leaders toward the trunk in western white pine. Univ. of Idaho, Range & Wildlife Exp. Sta. Res. Note No. 1, 3 pp., illus. Jan. 31.

1953. Survival probability and its application to damage survey in western white pine infected with blister rust. Idaho Univ., Forest, Wildlife, and Range Exp. Sta. Research Notes 7: 1-13.

Buchanan, Thomas S.

B.S.	(For.) University of Idaho	1935
M.S.	(For.) University of California	1937
Ph.D.	Yale University	1943

Students:

Frank G. Hawksworth	Harris H. V. Hord
Donald P. Graham	Thomas H. Laurent
Otis C. Maloy	

Publications:

Buchanan, T. S.

1948. Poria weirii: its occurrence and behaviour on species other than cedars. NW Science 22(1): 7-12. February.

1948. Study of the mortality of young western white pine trees. Univ. of Idaho Bull. Vol. XLIII, No. 6: 28-83, illus. Dec.

, George M. Harvey, and D. S. Welch

1951. Pole blight of western white pine: a numerical evaluation of the symptoms. Phytopath. 41(3): 199-208, illus. March.

Gilbertson, Robert L.

B.A.	(Bot.) Montana State University	1949
M.S.	(Bot.) University of Washington	1951
Ph.D.	(Pl.Path.) College of Forestry at New York State University	1954

Students:

Hubert H. Bynum

Publications:

Gilbertson, Robert L.

1956. The genus Poria in Central Rocky Mountains and Pacific Northwest. Lloydia 19: 65-85.

Gilbertson, Robert L.

1960. Studies on the western wood-rotting fungus Poria zonata
Bres. Can. Jour. Bot. 38: 87-91.

_____, C. D. Leapheart, and F. D. Johnson

1961. Field identification of roots of conifers in the Inland
Empire. For. Sci. 7: 352-356.

Partridge, Arthur D.

- | | | |
|-------|-----------------------------|------|
| B.S. | University of Maine | 1953 |
| M.S. | University of New Hampshire | 1956 |
| Ph.D. | University of New Hampshire | 1957 |

Students:

Alan E. Harvey
Roger D. Hungerford

Publications:

Partridge, Arthur D.

1968. Major decays of wood in the Inland Northwest. Univ. of
Idaho College of Forestry, Wildlife and Range Sciences,
Bull. No. 2, 79 pp., illus. October.

WASHINGTON STATE UNIVERSITY

Pullman, Washington

Research in Forest Pathology is relatively new at Washington State University, but instruction in Plant Pathology goes back to 1905. The first suggestion of a forestry interest came in 1912 when a course in Forest Fungi was offered. This was taught either by Dr. Harry B. Humphrey or Mr. H. P. Barss. The first course designated Forest Pathology as such was offered in 1917 and was personally taught by the world renowned Dr. F. D. Heald. Thus Forest Pathology was taught at Washington State College two years before it was offered at Idaho. At Washington State University, Forest Pathology has always been given in the Plant Pathology Department, whereas at Idaho it has always been included in the School of Forestry.

It is worthy of note here that Dr. Roderick Sprague, the internationally famous cereal pathologist, who died in 1962, earned his Master's degree at WSC in 1925, working under Dr. Heald on a forest disease problem for his thesis "A Witches'-broom of the Serviceberry." He also worked on ribes eradication during the early days of blister rust control.

It was not until 1947, however, that a new position was created on the staff for the specific purpose of teaching and conducting research in Forest Pathology. Dr. Charles Gardner Shaw was selected for this position and appointed as Instructor and Junior Plant Pathologist. Gardner immediately got involved in a problem of urban forestry--the dying of ponderosa pine in the city of Spokane, Washington and environs. This research continued until 1953 when it was conclusively demonstrated that the culprit was air pollution; fluorides released by an alumina reduction plant in the Spokane Valley. Indicator plants especially gladioli, were found useful both in diagnostic work and prescribing the limits of damaging concentrations.

Gardner has always had an interest in forest tree host and disease distribution records for the Pacific Northwest and especially mycology. This led to the publication of his valuable 2-volume host/fungus index for the Pacific Northwest in 1958 and to their updating 16 years later.

By 1959 he began to express an interest in the foliage diseases of western white pine and cooperated very closely with Dr. Leaphart of the U. S. Forest Service who worked at the Spokane Research Center. As a consequence of his cooperative research efforts, Dr. Shaw has been the recipient of generous Forest Service support. During the period 1965-1969 he recieved \$22,000 to work on the biological control of white pine blister rust and from 1967-1972 he had \$250,000 for the development of an information retrieval system for forest disease literature, especially on the biochemical aspects thereof. Gardner, together with Dr. S. O. Graham, also had a grant of \$23,203 from the Pabst Laboratories during 1962-1966 to study Phytoactin as an antibiotic--the antibiotic that once held some promise as a systemic control of white pine blister rust. He had earlier worked with Dr. Hubert of the University of Idaho in straightening out the nomenclature of the Leptographium complex. Gardner's interest in needle fungi led him also to work out the taxonomy and other features of Dothistroma pini on ponderosa pine.

Dr. Shaw served as acting chairman of the Plant Pathology Department for short time before he was elevated to the permanent position of Chairman in 1961, a position he held until stepping down in July 1972 because of health problems.

Dr. J. D. Rogers was added to the forest pathology staff in February 1963 and his interest in cytology, cytogenetics, and the genus Hypoxylon further rounded the area of expertise in the department. Jack came to WSU directly from the University of Wisconsin without prior work experience except as a graduate student. He and Dr. Shaw are both involved in the training of graduate students. Dr. Otis C. Maloy joined the staff in July 1963 as Extension Plant Pathologist. Otis brought with him, however, a continued interest in forest disease research he

had acquired working for four years with Potlatch Forests of Lewiston, Idaho, and earlier for a short time with the U. S. Forest Service at Lake City, Florida. Some of the work he started with Potlatch Forest has been continued and expanded, however, on a consultant basis.

Perhaps Dr. Shaw's most lasting contribution to forest pathology in the West has been in the training and guidance of graduate students who have gone on to positions of responsibilities in various parts of the country. Gardner's first graduate student was H. H. V. Hord who came from Canada to study under him from 1947 to 1949 before giving it all up to accept work that led to a permanent position with the Standard Fruit Company in Honduras. As a student, Harris wished to strengthen his background by taking certain forestry (including pathology) courses not offered at WSC, at Idaho. Shaw and Buchanan at Idaho, cleared this with their respective higher university officials and thus brought about the first inter-campus registration for a graduate student. This form of cooperation has since been commonplace, not just in forest pathology, but in nearly all disciplines on both campuses.

Notable among Dr. Shaw's students have been, and still are, Forest Service employees stationed first at the old Spokane Research Center and now at the Moscow, Idaho Forestry Sciences Laboratory. Several have had inservice transfers to these locations primarily so they could complete or further their graduate training in forest pathology under him.

APPENDIX

Shaw, Charles Gardner

B.A. (Bot.) Ohio Wesleyan University 1938
M.A. (Bot. & Pl.Path.) Pennsylvania State University 1940
Ph.D. (Bot.) University of Wisconsin 1947

Students:

H. H. V. Hord	B. D. Thyr
J. W. Koenigs	C. C. Gordon
Ed F. Wicker	Peter P. Sikorowski

Publications:

Shaw, C. G. and E. E. Hubert

1952. A review of the Leptographium-Scopularia-Hantschia
nomenclature. *Mycologia* 44: 693-704.

Adams, D. F., C. G. Shaw, and W. D. Yerkes

1956. Relationship of injury indexes and fumigation fluoride
levels. *Phytopathology* 46: 587-591.

Adams, Donald F., C. Gardner Shaw, Richard M. Gnagy, Robert K. Koppe,
Delbert J. Mayhew, and William D. Yerkes

1956. Relationship of atmospheric fluoride levels and injury
indexes on glagiolus and ponderosa pine. *Agric. and
Food Chem.* 4(1): 64-66. Jan.

Shaw, C. G.

1958. Host fungus index for the Pacific Northwest. I. Hosts.
II. Fungi. *Wash. Agric. Exp. Sta. Circ.* 335, 127 pp.;
Circ. 336, 237 pp.

and M. R. Harris

1960. Important diseases and decays of trees native to Washington.
Washington State College Exp. Bull. 540, 35 pp.

and C. D. Leaphart

1960. Two serious foliage diseases of western white pine in the
Inland Empire. *Plant Dis. Reprtr.* 44: 655-659.

Thyr, B. D. and C. G. Shaw
1964. Identity of the fungus causing red band disease on pines.
Mycologia 56: 103-109.

Rickman, John T., Alan E. Harvey, and Charles Gardner Shaw
1972. SOLAR: An on-line information retrieval system for plant
pathology. Washington Agric. Exp. Sta. Bull. 758, 8 pp.

Shaw, C. G.
1973. Host fungus index for the Pacific Northwest. I. Hosts.
Washington Agric. Exp. Sta. Bull. 765, 121 pp. Jan.

1973. Host fungus index for the Pacific Northwest. II. Fungi.
Washington Agric. Exp. Sta. Bull. 766, 162 pp. Jan.

Rogers, J. D.

B.S.	(Bot.) Davis and Elkins	1960
M.F.	Duke University	1960
Ph.D.	(Pl.Path.) University of Wisconsin	1963

Students:

Ralph Williams	August A. Loman
L. F. Grand	Ray Huff

Publications:

Rogers, Jack D.
1965. Hypoxylon fuscum. I. Cytology of the ascus. Mycologia 57:
789-803.

1969. Nuclear phenomena in the ascospore of Hypoxylon punctatum.
Can. J. Bot. 46: 865-866.

Jong, S. C. and John D. Rogers
1972. Illustrations and descriptions of conidial states of some
Hypoxylon species. Wash. Agric. Exp. Sta. Tech. Bull.
71, 51 pp.

Maloy, Otis C. (See Private Industry)

Students:

David Hudson

Publications:

Maloy, Otis C.

1967. A review of Echinodontium tinctorium Ell. & Ev., the Indian paint fungus. Wash. State Univ. Agric. Exp. Sta. Bull. 686, 21 pp.

and Robinson, V. S.

1968. Microorganisms associated with heart rot in young grand fir. Can. J. Bot. 46: 306-309.

1968. Decay fungi in young grand fir. Plant Dis. Reptr. 52: 489-492.

Students under other faculty:

Others who are now working in some aspect of forest pathology but took their graduate work at WSU under other members of Plant Pathology faculty include:

Harvey V. Toko

A. E. Harvey

R. J. Hoff

Gerald I. McDonald

T. H. Filer, Jr.

F. J. McCracken

N. E. Martin

UNIVERSITY OF MONTANA

Missoula, Montana

Instruction in forest pathology was first offered at what was then Montana State University when Dr. Charles W. Waters was hired in 1926 as Assistant Professor to teach that subject in the Department of Botany. This was just one year after Dr. E. E. Hubert had come to the University of Idaho to teach forest pathology in the School of Forestry there.

Although "Doc" Waters had just received his Ph.D. degree from the University of Michigan, he was not lacking in classroom experience. While studying mycology and plant pathology at Miami University (of Ohio) in 1919-1920 he was graduate assistant in charge of botany laboratories and gave lectures in botany and plant pathology. (At that time, there was an arrangement whereby one could study at Miami but get his degree from Ohio State.) Then again, while an instructor at Syracuse during 1921-1923, he assisted in elementary plant pathology and also in taxonomy and physiology. He went to Michigan as a graduate assistant in botany in 1923 but in the fall of 1924 he returned to Miami as Acting Assistant Professor in charge of the Botany Department while Dr. Fink was absent on sabbatical leave. There he gave lectures and supervised the laboratories in Botany I, gave the advanced course in mycology, and supervised a course in physiology. He returned to Michigan at the end of the first semester on a Cole Fellowship in botany, hoping to devote full time to his graduate studies. But in the first semester of 1925 he was back on as a half-time instructor in the Department of Botany and had charge of lectures and laboratory work in forest pathology, a senior course in forestry.

At no time during his tenure at Montana did Dr. Waters have adequate help, not even student help, and only token expense money so it is not surprising that he found it difficult to get deeply involved in personal research. Starting in

1930, however, he worked during the summer months as an Agent on ecology studies for the Office of Blister Rust Control, Spokane, Washington. By 1934 he had amassed so much valuable data that the Director, Stephen N. Wyckoff, wrote the President of the University requesting that Dr. Waters be granted leave in order to devote full time to writing up his findings for publication. Doc had always been studying the relations of forestry and logging practices to the ribes populations in the white pine type. Wyckoff considered his work of such importance and his results so striking and vital to the Blister Rust Control program as to warrant their publication in a professional journal. This request was approved and Doc worked on this manuscript from June 1934 to March 1935. According to Virgil Moss (OBRC) who assisted Dr. Waters during this period, good progress was made but the manuscript was never completed or published because the Bureau ran short of funds and terminated Doc's appointment. He never returned to complete the assignment so only contributions to OBRC annual reports record his five years of effort.

He attained the rank of full professor in 1935 and from 1938 to 1943 Dr. Waters held dual appointments in the Department of Botany and in the School of Forestry and was assigned a full-time load by both departments! During a typical year during this period, he would teach a course in silviculture and handle the laboratory work in dendrology in the fall quarter; teach another silviculture course and forest pathology during the winter quarter; and in the spring quarter serve as director of the Forestry School Clarke-McNary nursery. In the summers, he would collect material in the field for instructional purposes in his various classes and sometimes serve as Acting Dean of the Forestry School.

With the limited funds available to him, Dr. Waters did find a way to attend the Priest River Pole Blight Conference in early June 1951. He always did the best he could with the time, help, and funds available to him and in 1953 and 1954 he

collaborated with the Office of Forest Pathology, BPI, and the Institute of Forest Genetics in the vegetative propagation of western white pine. In 1959 he discovered the systemic nature of Elytroderma deformans at the same time as, but completely independent of, Dr. Lewis Roth at Oregon State University.

Dr. Waters' full and productive 34 years of involvement with forest disease teaching and research in Montana were brought to a tragic end on January 21, 1960 when he died from exposure to fumes emanating from a faulty house furnace, an accident from which his wife fortunately recovered. For the more than thirty years Dr. Waters had been known not only for his own investigations on rust diseases, mycorrhizae, ponderosa pine needle blight, mistletoe infestations, and other forest tree diseases, but also for his excellence as a teacher. His enthusiasm, friendliness, and encouragement created an awareness among students choosing forestry as their career of the importance of tree disease to effective forest management.

When Dr. Waters died on January 21, 1960, C. C. Gordon was hired in the spring as an assistant professor as his replacement to teach forest pathology in the Botany Department. Clancy was so fresh out of Washington State University where he did his thesis under Dr. Shaw on the life cycle and parasitism of the undescribed species of Meliolaceae attacking Solanum spp. that he had to return to Pullman that summer to complete his courses and thesis.

Dr. Gordon seemingly was not about to work under the austerity program that had been Doc Waters' lot. From 1960 to 1967 Clancy received \$50,000 NSF and \$20,000 U. S. Forest Service support to carry out research on the ontogeny and cytology of needlecast fungi. From this research over 25,000 permanent slides of diseased conifer needles were accumulated which probably constitutes the largest collection of such slides in the world and opened up a new approach to the classification of needle cast fungi.

By 1963 Dr. Gordon has become deeply interested and involved in conservation education and air pollution damage to vegetation and animals. He gave lectures

at scientific meetings throughout the State of Montana, in many other states, and in Canada.

In 1964 he was recipient of another \$10,000 NSF matching fund grant to upgrade microtechnique classes and introduce a new class on advanced histology, photomicrography, single cell isolation, use of radioactive tracers, and autoradiography. Dr. Gordon is certainly one of the best available to handle instruction in these areas for he is an outstanding microscopist and photomicrographer.

From 1967 to 1970, Dr. Gordon, in addition to his teaching duties, has served as consultant to the State Board of Health and the U. S. Department of Health, Education and Welfare. He testified and showed photographs to various state agencies on the seriousness of air pollution problems in Montana and argued for a strong air pollution bill. Since 1968 Clancy has been Professor of Botany and an advisory faculty member for the University of Montana Wildlife Unit. Since 1971 he has been Director of the Environmental Studies Program, University of Montana, Missoula.

Dr. Gordon currently has financial support totaling over \$60,000 from the following agencies for the stated purposes:

Fluoride Monitoring Study in the Glacier National Park, U. S. Department of Interior; Effects of Hydrogen Fluoride on Pollen Viability in Coniferous Species; McIntire-Stennis Investigation of Air Pollution Related Damage to Conifers in the Mt. Storm, West Virginia/Gorman, Maryland area; Environmental Protection Agency, A Comprehensive Manual on the Application of Histological and Laboratory Analysis Techniques in Determining Air Pollution Effects on Plants, Animals, and Identification of Specific Causation Agents; Environmental Protection Agency; Proposal for a Study of Indigenous Vegetation and Animals in the Colstrip Area of Montana, State of Montana, Department of Health and Environmental Sciences, and Environmental Advocacy for National Resources Defense Council and Environmental Defense Fund.

With these major research interests in forest pathology, air pollution, histology, and mycology it would appear obvious that Dr. Gordon has no cause to worry about what to do in his spare time, or the University to worry too much about his value as a member of the faculty. His already impressive list of publications will surely continue to grow in numbers and fields of competence.

APPENDIX

Waters, Charles W.

B.L. Berea College 1917
B.S. Berea College 1919
M.S. Ohio State University 1921
Ph.D. University of Michigan 1927

Students:

No graduate students actively involved in forest disease research.

Publications:

Waters, C. W.

1928. The control of teliospore and urediospore formation by experimental methods. *Phytopath.* 18(2): 157-213.

1957. Some studies of Elytroderma deformans on ponderosa pine. *Mont. Acad. Sci. Proc.* 17: 43-46.

Cohen, L. I. and C. W. Waters

1957. Some observations on an undescribed disease of ponderosa pine twigs. *Jour. For.* 55: 515-517.

Waters, C. W.

1958. Some studies on Elytroderma blight of ponderosa pine. II. *Proc. Mont. Acad. Sci.* 18: 7-8.

1962. Significance of life history studies of Elytroderma deformans. *For. Sci.* 8: 250-254, illus.

Gordon, Clarence C.

B.S. (Bot.) University of Washington 1956
Ph.D. (Pl.Path.) Washington State University 1960

Students:

Thomas Laurent
Russell Blaue

Publications:

Gordon, C. C. and O. L. Stein

1962. The use of tritiated uridine as a marker in studies of fungal life cycles. *Radiation Bot.* 2: 7-8, illus.

and G. G. Shaw

1964. Ascocarpic development in Diporotheca rhizophila. *Can. Jour. Bot.* 42: 1525-1532.

1966. Ascocarpic centrum ontogeny of species of Hypodermataceae of conifers. *Amer. J. Bot.* 53(4): 319-327.

1966. A reinterpretation of the ontogeny of the ascocarp of species of the Erysiphaceae. *Amer. J. Bot.* 53(7): 652-662.

1972. Plantations vs. power plants. *Am. Christmas Tree J.* 16(3): 5-10.

1972. Clarence C. Gordon's studies of air pollution in Garrison, Montana, 1966-1967. Environmental Pollution in Montana. Robert Bigart, ed. The Mountain Press Publishing Co., Missoula, Montana.

OFFICE OF BLISTER RUST CONTROL
(DIVISION OF FOREST PEST CONTROL)

For a few years after Offices of Forest Pathology were first opened (Region 5, 1910; Region 1, 1913; Region 3, 1914; Region 6, 1920), this agency of the Bureau of Plant Industry was the only Federal group concerned with the cause and control of tree diseases in the West. But in 1923, not long after the Portland, Oregon Office of Forest Pathology had been opened, an Office of Blister Rust Control was started for the West in Seattle, Washington, also an agency of the BPI. This move was doubtless another outcome of the International White Pine Blister Rust Conference for Western North America held in Portland, Oregon on April 23-24, 1919, given a high priority for action because of the discovery of white pine blister rust at Point Grey, B. C. in 1921. This new office was directed by H. P. Barss, head of Botany and Plant Pathology at Oregon Agricultural College and U. S. Department of Agriculture consultant, the same man who was primarily responsible for calling the 1919 meeting. One year later (1924), this office was moved to Spokane, Washington, and S. N. Wyckoff placed in charge. He reported to S. B. Detwiler, pathologist in charge of the Division of Blister Rust Control, BPI, from 1916-1934. (Det was assisted in the Washington Office most of those years by G. B. Posey who was placed in charge of the western district from 1928-1936.)

The BPI thus now had two arms with which to fight white pine blister rust in the West; the Office of Forest Pathology to conduct the essential and basic biological research on the etiology and epiphytology of the diseases, and the Office of Blister Rust Control to keep check on spread of the disease, the abundance and distribution of ribes and to field test the research findings into methods of controlling blister rust, and to develop tactics for delaying its

spread and buildup, including, of course, cost analyses of the procedures.

Just as it had been practiced in the East, control was predicated on the principle that although the rust could spread vast distances from pines to ribes, its ability to spread from ribes to pines was generally rather limited in range; therefore, eliminate or vastly reduce ribes populations and the damage to pines is reduced accordingly. It has already been pointed out under the Region 6 discussion that the original battle plan for keeping the rust out of the West was to somehow forestall its spreading across the plains and mountains from the East--only to be outflanked by separate importation into Point Grey, B. C. Just as logically then, initial control plans for the West were to attempt to develop a ribes-free barrier zone near the Canadian border to prevent the rust spreading down from the north into the valuable stands of western white pine in the States. Unfortunately, but not surprisingly, this did not work either. Years of experience have since disclosed the fact that by the time the rust could be found on pines in an area, it had likely already been there for perhaps as long as ten years. Consequently, control efforts were generally behind rather than ahead of the advancing blister rust menace.

But this is a history of forest disease research, not of forest disease control. Needless to say, a whole book could be written on the story of blister rust control in the West; the millions and millions of ribes destroyed by one means or another; the miles upon miles of string strung through the woods to guide eradication crews; the thousands upon thousands of CCC laborers employed starting in 1933, living in hundreds of tent camps scattered through the forests; the other laborers employed under 1934 NRA funds, and on 1935 WPA funds, and the last ditch attempt to stop blister rust damage by direct chemical application to already infected pine trees. Blister rust control work made it possible for many a young forester, and other aspiring college students, to earn the price of his education, and many a graduate forester completed his professional career

entirely within the blister rust control organization or the later agencies into which it eventually evolved. When the BRC program was at its peak in Region 5, for example, there was a blister rust control staff man in the Supervisor's office of every National Forest in California that had any sugar pine growing on it.

Within the Office of Blister Rust Control, however, there was set up in 1925 a project on the chemical control of ribes. This was soon broadened in scope to become the Development and Improvement (D&I) unit that did engage in essentially the more applied aspects of research. H. R. Offord was the original one-man crew but the staff grew under his leadership to eight permanent personnel in 1952 with Offord, C. R. Quick, G. R. Van Atta, and L. P. Winslow in Berkley, California, and V. D. Moss, R. T. Bingham, J. F. Breakey, and G. R. Stillinger in Spokane. Offord continued in this position of leadership until a Departmental reorganization in 1953 resulted in his transfer to the Pacific Southwest Station. He was succeeded in Spokane by Virgil D. Moss who continued it on until his retirement in 1966 although at times only he and R. T. Bingham were on the staff. Since the whole control program was based originally on ribes eradication, it is only logical that among the early studies were those on new tools and machines for pulling ribes, the ecology of ribes, and finally, the use of herbicides to kill these plants without harm to associated desirable forest vegetation. Over the years 1926 to 1956, the following summarizes the activities of the D&I unit:

Equipment improvement, safety, and field methods (19).^{1/}

Morphology of Ribes spp. and associated brush species (23).

Ecology of Ribes spp. in sugar pine and western white pine forests (23).

Ribes and pine seed germination tests, taxonomy, and growth (30).

^{1/} Number of separate studies or number of reports on subject area.

Cronartium ribicola epidemiology (9).

Chemical control of ribes (38).

Toxic action of chemicals on test plants (18).

Fungicides (4).

As noted earlier, work on the possibilities for chemical eradication of ribes started clear back in 1925. Moss got started on chemical control work out of Spokane about 1937 and R. T. Bingham got involved in rust resistance selection and testing of western white pines with a program going full-steam ahead by 1950. This is still a going program, but since 1960 it has been under Forest Service Research at the Forestry Sciences Laboratory, Moscow, Idaho, and is the most promising avenue of hope left for eventually surmounting the rust problem. Other names that also deserve mention here are: Rene d'Urbal, G. E. Draper, J. A. Vogtman, L. P. Winslow, D. R. Miller, one time members of the D&I unit, and certainly C. W. Waters, a most valuable cooperating ecologist from the University of Montana.

When World War II broke out in 1942, emergency funds dried up and the control program was significantly, if not drastically, curtailed. This pause provided opportunity to take a harder look at the effectiveness and economics of the whole effort. By 1954 it became obvious that in many areas ribes eradication wasn't doing the control job, and in many other areas it wasn't a paying proposition. It is only natural, then, that since the D&I unit had been working with chemical eradication of ribes, that they try direct chemical control of the rust on pines. They got really involved with this in the early fifties, working first with the promising systemic antibiotic cycloheximide (Actidione) and later with Phytoactin. Preliminary tests looked most promising so it was quite natural that operations was quick to grab the ball and run with it, realizing by then that ribes eradication alone was not establishing an economic level of control and that some other

approach must be taken to prevent total collapse of the program. To quote from the 1957 annual report from Region 1:

"Following the successful experimental work with actidione in 1956 in killing trunk cankers, several forests employed the procedure to save crop trees in white pine plantations and natural pole-sized stands. An expansion in the use of this treatment will be made in protected stands where blister rust infection took place in damaging amounts ahead of ribes eradication."

By 1960, that annual report from the same Region read, in part, as follows:

"Antibiotic development resulted in the continued fundamental departure in blister rust control methods and policies. An important transition from blister rust control through ribes eradication to control by application of antibiotics is being made.

"Preliminary results of aerial application of antibiotics by helicopter in June 1959 indicate that all blister rust infection was killed on about 80 percent of the trees."

and to quote further from this same report:

"The ultimate regional objective is to do all blister rust control work through aerial and hand application of antibiotics. This transition will be made as rapidly as sound research and development results will permit. Present 1961 plans are to aerially spray 11,000 acres of advanced reproduction, pole and mature pine stands in May and June, and 20,000 acres in September and October at an average cost of \$10 per acre."

As it turned out, interpretation of the effectiveness of antibiotic treatment had been made prematurely, especially in the difficult area of determining when a canker is actually dead, and the confusion caused on test plots by the hyperparasite, Tuberculina maxima, itself an agent for biological control. However, with the disease situation a desperate one, and lacking other than early results from testing, confounded by various factors like T. maxima, there was little alternative but to go ahead with antibiotics. During the early sixties, Forest Disease Research personnel installed comparable studies of their own, in the Southeast and Lake States on eastern white pine as well as on western white and sugar pines in the West and consistently came up with negative results. By 1964 Research personnel also had opportunity to go over some of the old D&I plots and point out interpretative errors there as well, errors that D&I personnel were also beginning to recognize. So, because of these findings, the erratic results being obtained from program experience, and the masking effect of natural canker deactivation which complicated the true effectiveness of antibiotics, it was decided in 1965 to suspend the use of Phytoactin and limit the use of cycloheximide to a small acreage of individually selected pines. By 1967, it was concluded to suspend control of white pine blister rust in the West due to failure of antibiotics in arresting infections on pines, along with the prohibitive costs of ribes eradication, and the program was closed out, except for the selection and breeding for resistance in pines. The biologically sound principle upon which control through ribes eradication was originally based broke down when such a critical mass of spores was being released into the air that man could no longer cope with the situation. The original idea of an average distance of spread from ribes to pine of 900 or 1,000 feet was generally sound, but it was only an average figure not predicted on any physical laws of speed or trajectory. Actually the distance was determined solely by how long a sporidium might survive to be carried to a suitable substrate and germinate and cause infection. Obviously

when the number of spores drifting around on the air currents increased, the odds on their being longer lived and tougher ones increased proportionately. It was a battle lost to mass invasion and to the vagaries of climate and turbulent air characteristic of the generally rugged topography of the western white pine type.

Now let us turn to Spokane and 1924 when S. N. Wyckoff was placed in charge of the Office of Blister Rust Control and trace the chronology of the organization in brief fashion to the end of 1972 and thus complete the history. By 1934 blister rust control was a vital program in the sugar pine region of southern Oregon and California as well as on western white pine in the Inland Northwest. Also in 1934 there was a reorganization in the U. S. Department of Agriculture and BRC was transferred out of the BPI and placed in the Bureau of Entomology and Plant Quarantine. At that same time, Steve Wyckoff transferred to the Forest Service to become Director of the Northern Rocky Mountain Forest Experiment Station and Herman E. Swanson replaced him as head of BRC in Spokane until he retired in October 1958. Along about that same time, the sugar pine region was split off from the Spokane office as a separate region and W. V. Benedict, an experienced blister rust expert since 1924, placed in charge with headquarters at various places in the Bay Area of California.

An organizational change in the Bureau of Entomology and Plant Quarantine in 1951 saw Benedict promoted to become director of all Bureau activities in the seven western states, and T. H. Harris moved into the blister rust spot he vacated. In 1953, the USDA went through yet another reorganization and BRC was moved into the Forest Service where it should have been all along. The D&I unit remained in Spokane quartered with the Intermountain Station's Inland Empire Forest Research Center, however, though under S&PF rather than Research. This was the same reorganization that brought the Division of Forest Pathology from the BPI and forest insect research from BE&PQ into the Forest Service.

On January 8, 1954, Mr. Benedict was selected to direct this new blister rust control program from the Washington office of the Forest Service. A little more than a year later, other tree disease control programs, and control of forest insects were brought together with the blister rust work to form the new Division of Forest Pest Control under State and Private Forestry. Benedict remained in charge until he retired on the last day of December 1966. With this expanded workload, Mr. Benedict brought in R. K. Smith from the old forest insect office to assist him and in 1956 called in another old blister rust expert from Oregon, C. P. Wessala, to handle the blister rust work. Then in 1958, J. M. Whiteside, an entomologist from Oregon, was added to the staff. Russ Smith left in 1958 to head up Pest Control work in Region 8 and was replaced by J. W. Bonberg from the old insect research office of the Forest Service in Washington. Whiteside retired in 1965 and was replaced by John George from the Northeast and Don Pierce came in about this time for a short while from the West. Connie Wessala retired the last week of December 1966; Don P. Graham came in from Region 6 to replace Connie and Bonberg was elevated into Benedict's old position. In 1969 Amel Landgraf replaced Pierce but he left in September 1971 for Region 8 and John Chansler came on in February 1972.

Bonberg retired in October 1968 and David E. Ketcham transferred in from Forest Pest Control, Upper Darby, Pennsylvania to take over as Chief of the Division of Forest Pest Control in October 1969. Don Graham was acting in charge during the intervening months. In August 1972, Ketcham went to the Regional Office in Atlanta as ARF and R. K. Smith came back from Atlanta as his replacement in November 1972.

Forest Pest Control is now as vital a part of the Forest Service as is Forest Disease Research or Forest Insect Research. In the East and South they operate out of a series of zone offices, while in the West, where the bulk of

the National Forest lands are located, they are generally organized as a Branch in Timber Management at the Regional Offices. Their staffs are constantly being upgraded with a number of Ph.D's now among them. In many respects theirs is now the more important role; getting the results of forest disease and insect research into practice not only on Forest Service lands, but on other Federal and state and private holdings as well.

Some old blister rusters such as Benton Howard in Region 6 and Roy Blomstrom in Region 5 made the transition to directing pest control programs in outstanding fashion. They knew the problems from past experience; now they were in position to use highly trained technical assistants, and placed in intimate contact with the research workers so they could tackle problems of mutual concern side by side. In retirement, they have been replaced by men with more academic training, but certainly with far less practical experience.

APPENDIX

Wyckoff, Stephen N.

B.S. University of California 1914

Detwiler, Samuel B.

B.S.F. University of Minnesota 1906

Posey, G. B.

B.S. Maryland College 1912

M.S. Oregon Agricultural College 1915

Offord, Harold R. (See also Pacific Southwest)

B.A. (Bio-chem.) University of British Columbia 1924

M.A. (Bio-chem.) University of British Columbia 1925

Publications:

Offord, H. R.

1931. The chemical eradication of Ribes. U. S. Dept. of Agr. Tech. Bull. 240, 24 pp.

_____, C. R. Quick, and V. D. Moss

1944. Self-incompatibility in several species of Ribes in the Western States. Jour. Agr. Res. 68: 65-71.

_____, C. R. Quick, and V. D. Moss

1952. Improvement in the control of Ribes by chemical and mechanical methods. U. S. Dept. Agr. Circ. 906, 72 pp.

_____, C. R. Quick, and V. D. Moss

1958. Blister rust control aided by the use of chemical killing Ribes. Jour. For. 56: 12-18.

Moss, Virgil D.

B.S. (For.) University of Idaho 1932

M.S. (For.) University of Idaho 1933

Publications:

Moss, Virgil D. and Charles A. Wellner

1953. Aiding blister rust control by silvicultural measures in the western white pine type. U. S. Dept. Agr. Circ. No. 919.

_____, Henry J. Viche, and William Klomprens

1960. Antibiotic treatment of western white pine infected with blister rust. Jour. For. 58(9): 691-695.

(Contains this prophetic warning: "Antibiotic control of blister rust of western white pine has been so phenomenal that danger exists in becoming overly optimistic about the possibilities of discontinuing a ribes destruction program to prevent new infections")

- _____
1957. Acti-dione treatment of blister rust trunk cankers in western white pines. Plant Dis. Rept. 4: 709-714. Aug. 15.

Bingham, Richard T. (See also Intermountain)

- B.S. (For.) University of Idaho 1940
M.S. (For.Path.) University of Idaho 1943

Swanson, Herman E.

- A.B. University of Idaho 1927

Benedict, Warren V. (See also Pacific Northwest)

- B.S. (For.) Oregon Agricultural College 1924

Publications:

Benedict, Warren V.

1966. Experience with antibiotics to control white pine blister rust. Jour. For. 64(6): 382-384.

Harris, Thomas H.

- B.S. (For.) University of California 1929
M.S. (For.) University of Idaho 1930

Howard, Benton

B.S. (For.Engr.) University of California 1927

Blomstrom, Roy

B.S. (For.) Oregon State College 1931

DISTRICT (REGION) 3 - (and REGION 2)

Southwestern Forest and Range Experiment Station
Rocky Mountain Forest and Range Experiment Station

It should be kept in mind that the original agreement between the Forest Service and the Bureau of Plant Industry was for cooperative Consulting Pathologists to work with the Regional (District) Foresters. Many geographic regroupings have since taken place and Forest Disease Research is now part of Forest Service Research. Hence, pathologists now serve Station territories, although they certainly continue their close cooperation with Regional Foresters, so a brief developmental history may be helpful.

1908 - Fort Valley Experimental Station established near
Flagstaff, Arizona.

1915 - Branch of Research authorized for the Forest Service.

1930 - Southwestern Forest and Range Experiment Station
established with headquarters at Tucson, Arizona
and Fort Valley absorbed.

1935 - Rocky Mountain Station established with headquarters
at Fort Collins.

1953 - Rocky Mountain and Southwestern Stations consolidated
with headquarters at Fort Collins under name of Rocky
Mountain Forest and Range Experiment Station.

Territory now served by this Station includes Arizona,
New Mexico, West Texas, Oklahoma panhandle, Colorado,
Kansas, Nebraska, South Dakota, North Dakota, and the

eastern two-thirds of Wyoming. It thus still serves Region 3, but now all of Region 2 as well. While the Station does maintain a forest disease research project at Lincoln, Nebraska, the Plains area is outside the scope of this report.

Dr. George G. Hedgcock was the first federally appointed forest pathologist to explore the Southwest, having first roamed that territory out of the Washington Office, by whatever means of transportation available, in 1908, and continuing to survey the western National Forests until 1920. He was assisted at times (1910-1925) by Ellsworth Bethel who was Curator of the Denver Museum of Natural History but also holder of an appointment as Associate Pathologist with the Division. Bethel had actually been making collections of forest fungi in Colorado even before Hedgcock arrived; as early as 1897 on the Ute Reservation in southwest Colorado. Bethel was the leading authority on rusts of the Rocky Mountain region at that time. Hedgcock was also assisted at times (1913-1920) by N. R. Hunt, another specialist on forest tree rusts and a BPI appointee from 1913 to 1920, and by Professor W. L. Bray, University of Texas, a Special Agent, Investigations in Forest Pathology, and a collaborator with the Bureau of Forestry from 1899 to 1909 as an authority on the mistletoes, especially in Texas.

Dr. William H. Long was the first Federal forest pathologist permanently assigned to the Southwest. Region 3 thus became the third region or district to be assigned a resident Consulting Forest Pathologist in accordance with the terms of the March 21, 1910 agreement between the Forest Service and the Office of Investigations in Forest Pathology of the Bureau of Plant Industry.

Dr. Long assumed his newly assigned duties in the Southwest in the late fall of 1911, and established his headquarters at Albuquerque, New Mexico in 1913. This remained his base of operations through the final years of his professional career until his retirement on July 1, 1937. He died 10 years later. But Long was no novice when he accepted this position. He had already served for nine years as Professor of Botany at North Texas State Normal College at Denton, Texas after receiving his Master's degree from the University of Texas. During this teaching period he continued his mycological studies on the Uredinales, Ravenelias, and Phalloideae, increasing his competence in this field by summer studies at Cornell University.

In January 1910 he joined the editorial staff of the Experiment Station Record, U. S. Department of Agriculture, Washington, D. C. It took him but 18 months to discover that this paper shuffling was not his cup of tea. Fortunately he was able to get on with the still new Office of Investigations in Forest Pathology in Washington, thus becoming one of the early pioneers in that field. After a short stay in the Washington Office where he studied wood rots and the Gymnosporangium forest tree rusts, he was selected to head up the new field station in the Southwest.

When Doc Long first landed in this new domain he actually roamed from Arizona to Florida, at times accompanying Dr. Hedgcock on his survey work, but soon settled down to confine his activities to Arizona and New Mexico with an occasional junket into Colorado where Hedgcock had primary responsibility.

For an essentially pure mycologist, it took Doc Long but a short while to concur that the basic forest pathology problems outlined by Hedgcock and recognized by the Forest Service in this semi-arid territory were indeed the dwarfmistletoes, slash decay, and trunk rots in general, especially the red ray rot of ponderosa pine, always in special reference to management practices.

Sixty years later pathologists in the Southwest are still involved with these two later problems. He did, of course, continue his work on forest tree rusts, and the fungi rotting forest products such as railroad ties, fence posts, and poles. He worked very closely with Forest Service employees, seeming to realize from the start the intimate relations between forest pathology and silviculture, working on problems such as the silvicultural treatment of ponderosa pine stands full of dwarfmistletoe and problems of slash disposal. Much of the data for his defect studies came, as a matter of fact, from Forest Service timber sales records.

From pure conjecture, the Forest Service must have provided him with all of his field labor and temporary assistants for there is no record of another professional pathologist being permanently assigned to work with Dr. Long in the Southwest until 1934. During this over 20-year interval, however, he did, at times, have the help of two women; R. M. Harsch who assisted him on the pure culture work in the laboratory and was on the roles as Assistant in Forest Pathology, and Miss Bessie E. Futtrell (later Mrs. Etter) who handled the clerk-stenographic work, including the typing of the annual reports to Washington headquarters.

This laboratory work where Ms. Harsch assisted was part of Dr. Long's studies on the durability of various local tree species, especially Gambel oak, as fence posts, and on slash decay fungi. They may well have been the first to attempt the identification of wood-rotting fungi by their characteristics when grown in pure culture on artificial media, studying as many as 8,000 to 12,000 isolates each year.

Dr. Long got involved in a number of issues, like slash disposal for example, where he convinced foresters that piled slash really constituted a fire hazard for many years. He also convinced them that "pulled" slash was

the best way to dispose of it, i.e., simply leave the tops intact but pull them away from the seed trees to be left at harvest cut. He worked on diseases of shade and ornamental trees as well, especially on how to avoid the nuisance of "cotton" falling from cottonwood trees. In his annual report for 1917 there was complaint about the slow down because of the war and his having to supervise "white pine blister rust" eradication in several southwestern states (one has to wonder now, what white pine blister rust, but it must have been Cronartium occidentale on pinyon pine). Another interesting detail in 1931 also elicited complaints because he was assigned to do a special study for the War Department as to how to control mosses and lichens growing on headstones in military cemeteries in Oklahoma, Arkansas, Texas and New Mexico.

Joint authorship on many of his various publications shows that Long collaborated or cooperated with a number and variety of people. Obviously George Hedgcock, who also roamed the Southwest, shared Long's interests in the rusts. When they authored their paper on dwarfmistletoe, C. F. Korstian was a Forest Service employee. Ellsworth Bethel was with the Colorado State Museum; W. L. Bray was a professor from the University of Texas and later Syracuse University and a collaborator of the Bureau of Forestry from 1899 to 1909 working on mistletoes in Texas; and N. R. Hunt was a plant pathologist in the Bureau of Plant Industry from 1913 to 1920 working on forest tree rusts, but with no indication of ever being headquartered in the Southwest. Dr. Long's publications number in the seventies but the few selected for inclusion in the appendix are the ones most intimately concerned with forestry.

Perhaps the biggest headache of Dr. Long's career was caused by what eventually turned out to be a relatively insignificant forest tree problem. As early as 1917, Doc Long and others had under observation around Prescott, Arizona a twig blight of ponderosa pine. A little research was started on the

problem as early as 1919, especially attempts to get the causal organism into pure culture. More serious investigations began about 1931. Entomologists and pathologists tossed the problem back and forth, first accepting then rejecting responsibility for the problem according to current opinion as to the causal organism. By 1933, the problem looked serious enough and with the availability of CCC and related funds it was possible in 1934 to expand surveys and research. Thus, Dr. Long was able to hire his first permanent assistants!

Though the cause was not yet known, serious local outbreaks near Prescott, Arizona and Silver City, New Mexico caused concern over a possible flareup of disastrous character. With CCC funds available, consideration was also given to attempting an expanded control job. But, before launching this undertaking, it was deemed expedient to find out just how widespread the problem really was and hence whether or not further coverage beyond the areas already worked over was worthy of consideration. So, in the summer of 1934, under Dr. Long's general supervision, a windshield survey was attempted of the entire range of ponderosa pine in the United States! Crews assigned from all Stations within the ponderosa pine range met at Prescott, Arizona (over the 4th of July) for a training period, to learn what they were looking for, standard reporting forms and procedures, maps to be used, etc. The plan was to work in two-man teams traveling by car, taking turns driving while the other observed and kept track of where they were on the map or navigated. Mention was made briefly in the section on Region 6 that Thomas S. Buchanan had responsibility for the crews in Washington, Oregon, Idaho, and Montana. (It turned out to be most unfortunate that one crew member could neither drive a car nor read a map!) Don Ellis was responsible for the work in New Mexico and Colorado while Ferdinand W. Haasis showed up as a member of a California crew. Dozens of persons were involved, most long since forgotten.

This was an exceptional summer. Crew leaders were paid \$200 per month, got 6 cents per mile for use of their car, and \$6.00 a day per diem unless they stayed in a CCC camp (where they were supposed to a majority of the time) where the per diem was \$1.00. When finally departing Prescott to return to their assigned territories and start scouting, one leader asked Doc Long if he had any last minute advice to offer. "Yes, plan your itinerary so when night comes you are as far away from a CCC camp as possible."

To make a long story short, no one found any twig blight beyond the already known general range and an expanded control program was never undertaken except for the several thousands of acres covered by CCC works on National Forests in Arizona and New Mexico. But how many weeks does one travel, constantly looking at ponderosa pine day after day before he begins to doubt there really isn't any twig blight here, but instead begins to wonder if I have forgotten what the hell I am looking for! The happy ending is that, going their separate ways, the pathologist and entomologist eventually got together to publish their findings that twig blight, once thought to be caused by the fungus Cenangium abietis was really caused by the scale insect Matsuccoccus vexillorum.

Don E. Ellis was one of the several pathologists that started work in the Southwest in the summer of 1934 because of the availability of CCC funds. Don had started on a Ph.D. program at LSU but ran out of funds so went to the Shelterbelt Program in Iowa as a pathologist in 1933 on State Emergency Conservation work. In May of 1934 he went to Prescott, Arizona to work for the Division of Forest Pathology.

Dr. Long put him in charge of the twig blight scouting work out of Silver City, New Mexico and in October 1934 he was made a full time employee and worked him on all phases of twig blight and needle casts in general with research headquarters in Prescott, Arizona. During the big one-shot scouting program he

was responsible for the southern half of Colorado.

After the twig blight scare quieted down, he was moved to Albuquerque early in 1938 and put to work on the dwarfmistletoe problem. He left Albuquerque to accept employment on July 1, 1940 as a vegetable pathologist at North Carolina State College, but he did return to the Southwest for two to three months during the summer of 1944 to finish up survey aspects of certain phases of his dwarfmistletoe work which provided the basis for his Ph.D. dissertation.

Although Don didn't stay long in the Southwest, or with the Division of Forest Pathology either for that matter, he gave a good account of himself and demonstrated later that the Federal Government lost a good man when he left. Without going into all the details step by step, he has been with North Carolina State University ever since he first joined them in 1940 and rose to be Professor and Head of the Plant Pathology Department in 1954, the position he still holds. He attained top honors in the American Phytopathological Society, being elected president for the 1969-1970 year.

Lake S. Gill went to work in the Southwest at Albuquerque, New Mexico, within a few weeks, perhaps within a few days, of the same time Don Ellis did in the summer of 1934. But he had been around a lot more before he arrived, and stayed a lot longer in the Southwest than Don did.

Lake had been a field assistant to Dr. Meinecke for two or three years in San Francisco, had had a tour of duty for four years in the Washington Office on chestnut blight work, been returned to San Francisco for another couple years, and in 1933-1934 was reassigned to New Haven, Connecticut (he had had a year of residence there earlier in 1925-1926) to complete his work on his doctoral dissertation. It was from there that he was assigned to Albuquerque and he remained in the central Rocky Mountains the balance of his career.

Lake worked generally across the board on the same problems Dr. Long had identified; the dwarfmistletoe, tree rusts, timber decays, and on one or two new problems, the bacterial blight of the saguaro cactus, and pole blight of western white pine. He accepted increased responsibility and when Dr. Long retired in 1937 he was named as his successor and placed in charge. He took time out from 1942 to 1945 to serve as an officer in the United States Army.

When the Southwestern and Rocky Mountain Stations were consolidated, Lake was moved to Fort Collins, Colorado, in 1954 as Chief of the Division of Forest Disease Research, U. S. Forest Service, in the Rocky Mountain Forest and Range Experiment Station. This position he held until his retirement on February 29, 1960. In 1961 he accepted an assignment for a year as forest pathologist in Tanganyika. Following that, he and his wife enjoyed desert living in Apache Junction, Arizona, until his death on July 5, 1969.

In the late thirties and early forties Lake became involved in the disease that was decimating the giant saguaro cactus in Arizona. Dr. J. G. Brown of the University of Arizona was already involved in this same problem and seemingly resented the intrusion of "outsiders." Gill was taken off that job in the late forties to supervise pole blight research in north Idaho and Montana, and Marvin E. Fowler was assigned to run the cactus project by remote control out of the Washington Office. The dilemma was nicely resolved when in the 1954 reorganization this type of work became the responsibility of ARS and Curtis May took his turn at trying to work on it from Beltsville.

Gill thus became involved in another problem way out of his geographic territory or even area of prior related experience when in the late forties he was assigned to study the pole blight of western white pine in the Inland Northwest. At that time the Federal Government, i.e., the Division of Forest Pathology, had no pathologist assigned to the territories served by either the Northern

Rocky Mountain or the Intermountain Forest and Range Experiment Stations. Neither had the Pacific Northwest Station fully accepted the responsibility of filling in this void as had been expected. Gill and Stu Andrews were sent up from the Southwest in the summer of 1948 to look the situation over, do a little scouting, and undertake some preliminary studies, and Gill was back again in 1949. The situation was relieved when Don Leaphart was assigned to Missoula in 1950, specifically to work on this problem. The pole blight story is covered in more detail in the Intermountain Station report since they and the University of Idaho eventually carried the ball themselves.

Lake is best known and will always be remembered for his monograph treatment of the genus Arceuthobium in the United States and his subsequent research and missionary work on the dwarfmistletoe. As events have since developed, he may be well remembered, too, for the fine training and encouragement he gave to one of his assistants, Frank G. Hawksworth who is already wearing Lake's old crown as "Mr. Mistletoe" and finding that it fits quite nicely.

Stuart R. Andrews joined Dr. Long's crew at Albuquerque in the summer of 1935 on a 30-day appointment on CCC funds to work with Lake Gill on western red rot! Stu is one of a kind in Forest Service forest disease research, i.e., the only western pathologist ever to get his bachelor's degree from Yale University. (Makes it handy to have been born and raised in New Haven, Connecticut.)

Obviously Andrews stayed beyond the 30 days, spending his first two years in the Black Hills on a red rot survey of younger ponderosa pine subject to TSI work by CCC labor. In 1938-1949 this type of survey work shifted to Arizona and New Mexico. CCC funds dried up about this same time so the survey folded as did the Prescott twig blight work about this same time also.

After this, Stu got started on dwarfmistletoe research, putting in plots on the Wing Mountain unit of the old Fort Valley Experiment Station in Arizona

in 1939. His purpose was to test conventional timber marking versus dwarf mistletoe marking prior to cutting--and also made defect studies in the merchantable trees cut. (Somehow reminiscent of what Doc Long worked on nearly 30 years prior though this study was made in conjunction with a second cut.) He also became involved in studies of aspen deterioration on the north rim of the Grand Canyon and continued such studies until leaving for the war in March 1942.

When Stu returned from his duties as a medical officer in March 1946 he was assigned once again to Albuquerque where Jim Mielke had been filling in for Lake Gill who had also been gone for military duty. Only two months later Stu transferred to Columbus, Ohio, to work with Roger Swingle on elm phloem necrosis. Again this was but a short term move for that fall he moved on to Minnesota for graduate study under the famous Dr. E. C. Stakman at the University.

When Stu finished his residence at Minnesota in 1948 he once more returned to Albuquerque where the first thing he did was join Lake Gill and others at the Priest River Experimental Forest, Idaho, where they put in a few weeks on the pole blight of western white pine. (Pete Millenbaugh joined them as a field aid that summer while Tommy Hinds filled that spot the next year.) Dr. Andrews returned to Albuquerque once again and started serious work toward his Ph.D. thesis problem--more western red rot. He continued at Albuquerque until Dr. Gill retired in 1960 and was then moved to Fort Collins, Colorado as his replacement as Division Chief for Forest Disease Research. Dr. Andrews retired in 1970 but he and his family still reside in Fort Collins.

Paul C. Lightle first went to work for the Division of Forest Pathology in Tucson, Arizona in 1941. At that time, the Division was assigned the survey aspects of the giant cactus disease and Paul was detailed to work under Dr. Gill on that problem. This was a natural for Paul since he had already been studying

the disease under Dr. Brown at the University of Arizona and, in fact, had worked on it as his Master's problem. Dr. Brown still retained certain research responsibilities and his graduate students and he seem to have had the causal bacterium in pure culture for some time before they let the rest of the world know.

Paul was a native Arizonan so it is only natural that he did his basic college work there and sought employment there too. He had worked in the area of hydrology as an assistant with the old Southwestern Station in Tucson in the summers of 1936, 1938, and 1939, and with the University of Arizona during the summer of 1940 on a Federal grant studying Texas root rot of pecans.

Paul transferred to the San Francisco office in August 1947. With time out for duty with the U. S. Navy from 1942 to 1945 it is obvious he really did not have much time to devote to his research during this phase of his career. He stayed in PSW territory until June 1956, in the interim earning his Ph.D. at the University of California at Berkeley, when he was transferred to Gulfport, Mississippi as a Project Leader. It was from Gulfport that he was transferred to Albuquerque in 1960.

About the same time Dr. Andrews was moved to Fort Collins to replace the retiring Dr. Gill, so Paul once again found himself as Project Leader. But it was as leader of a one-man band until July 1, 1962 when Jerry Riffle was appointed to work with him. But Riffle was transferred to Lincoln, Nebraska at the end of August 1972, so Paul found himself alone again--the only Forest Service pathologist in the original Southwestern Station territory. And so it will probably remain as Paul expects to retire late in the fall of 1973 to some place in the Southwest, probably on a trial basis for he will be meeting only minimal eligibility requirements at that time.

On his second go around in the Southwest from 1960 to present, Paul continued as best he could with the available help on the old line work on red-ray rot,

dwarf mistletoe studies, and a survey of heart rots in Region 3. Some of the latter was done in connection with harvest cuts of ponderosa pine on Indian lands. In fact, work in the Southwest has always been in close cooperation with the Bureau of Indian Affairs and with the National Park Service.

In 1942, James L. Mielke was transferred from the San Francisco office to Albuquerque, New Mexico though still under Dr. Wagener's general supervision. As noted earlier, Drs. Gill, Andrews, and Lightle had all gone into the military services for a number of years each. Jim was transferred into their old territory to hold the pieces together until they returned.

And that's about all one man could possibly do. Dr. Mielke did some research on Cronartium filamentosum on ponderosa pine, spent one summer on the rate of deterioration of bug-killed Engelmann spruce, and spent some time on a root disease of pinyon pine and the saguaro cactus problem.

When Dr. Gill returned from military service in 1945 he naturally reclaimed his old position of responsibility. While Mielke remained in Albuquerque quite awhile thereafter, he was actually on what might be called detached duty, still reporting directly to Dr. Wagener in the San Francisco office. But Jim found himself more or less running the store again while Gill, sometimes assisted by Andrews and a technician, summered in north Idaho and Montana in 1948 and 1949 on pole blight studies of western white pine.

Dr. Mielke was transferred to Logan, Utah in May 1950 and thus became the first Federal forest pathologist ever permanently assigned to Region 4 or the territory served by the Intermountain Station.

Craig Bryan came to work for the Division of Forest Pathology at Tucson, Arizona in July 1948 to work on the giant cactus disease under direction of Marvin Fowler out of the Washington Office. Craig was another natural for the job, having just completed his Master's degree at the University of Arizona working on that very problem. They had to do a lot of improvising in those days but

ended up with fully adequate office and laboratory facilities somewhere in the lower depths of the football stadium.

In the 1954 reorganization of the Department of Agriculture, however, the cactus work was reassigned to ARS so Craig's official connection with the Division of Forest Pathology actually ended at that time. Craig elected to stay on the same job, in the same place, only now reporting to Curtis May in ARS who was having his turn at trying to run a research job in Arizona out of Beltsville, Maryland. Curtis must be given credit for reviewing the field work at least once each year, however, generally when the snow was deepest and the weather the coldest in the Washington area.

On January 1, 1955, Craig left ARS and went with the Forest Service at Athens, Georgia. He first ran a study on hardwood defects but for many years now has been a valued member of the Soil-Borne Organisms project, now under the capable leadership of Dr. Don Marx.

Craig went back to the University of Arizona in 1963 (from Athens) and finished his course work, etc., for his Ph.D. However, he was unable to repeat his previous success on saguaro cactus while working on a seemingly similar disease of the organ pipe cactus, so, unfortunately, never received the higher degree he sought.

Frank G. Hawksworth first went to work for the Division of Forest Pathology in late 1949 at Albuquerque, New Mexico for Dr. Lake S. Gill who immediately set him to work researching dwarfmistletoe problems in the Grand Canyon area. Frank previously had a "checkered" career in blister rust in the California Sierras during the summers and had worked as a summer assistant on the University of Idaho pole blight research crew in 1948. After graduating in 1949 he was rehired by the University on a more permanent basis to continue on that project. In the fall of that year, however, Dr. Buchanan, recognizing his potential as a researcher, recommended him to Dr. Gill. Fortunately, for both of them, Lake was able to hire

Frank immediately because one of his technicians, Pete Millenbaugh, had just decided there was a better future in the Post Office Department as a local letter carrier. Hawksworth and Hinds thus became Lake's two technical aids.

In making idle conversations with some of his Department of Interior compatriots one day, Frank allowed as how a good man could make a round trip trek across the Grand Canyon between daylight and dark of the same day. Having vowed he thought it could be done, Frank felt obliged to prove his point. So, early in the morning on Thanksgiving Day, 1950, he set out from the South Rim, walked to the Canyon bottom, thence up to the North Rim. He then turned right around and made the same trip in reverse. This involved a vertical descent and ascent of about 13,000 feet. The 45-mile trip took him 18 hours and to date there is no evidence to indicate his record has ever been broken.

Frank only worked a couple years on dwarfmistletoe problems among the Mescaleros Apaches when he took off for one year to earn his Master's degree at Yale University. Then the Army pulled his number out of the bowl in 1954, but kept him only briefly before they released him because of his chronic asthmatic condition. Frank really didn't get a chance to settle down to his mistletoe work even then for in 1956 it was back to Yale again for residence requirements for his Ph.D.

When he returned this time, he found himself stationed at Fort Collins, Colorado to where headquarters had been changed upon consolidation of the Southwestern and Rocky Mountain Stations. Stu Andrews was still laboratory leader at Albuquerque since Dr. Gill had been moved to Fort Collins as Division Chief in 1954. This left Ross Davidson as laboratory leader at Fort Collins until 1957 when he went back to Beltsville. Frank was then moved up the line and has served as the equivalent or as project leader ever since. With all of these interruptions, reorganizations, and moving about, he has made a lasting contribution already to dwarfmistletoe knowledge. He has done some fascinating,

interesting, and important research based largely on imagination, initiative, and ingenuity not just of himself but especially with the aid of one of his fine assistants, Tommy Hinds. He has cooperated in his work with many agencies and individuals, especially with his closest neighbors to the south in Mexico. The character of the selected references cited will attest to the calibre and variety of this work.

Among the projects requiring this kind of imagination and initiative was one on advising National Park Service personnel how to fell, or drastically prune, and dispose of the evidence, of heavily dwarfmistletoe-infested ponderosa pine trees along the south rim of the Grand Canyon during the height of the tourist season. Interest in this joint Park Service-Forest Service project is still high and a paper in press describes the first 22 years of effort.

Dr. Hawksworth is Project Leader of Diseases of Forests and Woodlands, Central Rocky Mountains, with a small but very active staff of Thomas E. Hinds and John M. Staley. They are all located in fine Forest Service facilities in Fort Collins and get their excellent administrative supervision from Assistant Director Carl M. Bernstein, who is also responsible for forest insects and timber management research in the Rocky Mountain Forest and Range Experiment Station.

When Thomas E. Hinds started as a temporary Field Assistant at Albuquerque on May 8, 1950, he had a couple of years work at the University of New Mexico. Tommy was a hard worker, a keen observer, ready learner, and full of initiative, always trying to figure out a better way of doing a better job. He worked under Drs. Gill and Andrews at Albuquerque on dwarfmistletoe and red rot until moving to Fort Collins in December 1955 as part of the Station consolidation plan.

Mr. Hinds received his permanent appointment as a Field Assistant in January 1955, then in 1958, though he wasn't elevated in grade at the time, he did get permanent appointment in the professional series as a Plant Pathologist. Tommy

obviously took advantage of the opportunities offered on campus when moved to Fort Collins and has since earned both his Bachelor's and Master's degree at Colorado State University and attendant promotions.

When he first came to Fort Collins he worked mostly with Ross Davidson on rots of aspen and fir. (In 1951 he had been detailed from Albuquerque for the summer to work with Ross and Hawksworth on the deterioration of the bug-killed Engelmann spruce.) After Mr. Davidson returned to Beltsville in 1957, Tommy continued the decay studies on alpine fir and Engelmann spruce but also worked with Dr. Hawksworth on dwarfmistletoe.

They made an exciting team, both energetic and full of ideas, as is attested by their respective selected bibliographies as cited. Tommy developed into an exceptional photographer and an outstanding laboratory technician. In 1962 he and Andrews did a study of decay in overmature ponderosa pine in the Black Hills. He and Davidson found the first Hypoxylon canker of aspen in Colorado. His current major assignment is on aspen diseases and to follow the deterioration of bug-killed Engelmann spruce in Colorado. Having worked to some extent on essentially every pathological problem researched in the Southwest and Rocky Mountain areas and perforce having spent some time with essentially every professional forest pathologist assigned to that area, Tommy is certainly well qualified to contribute to any problem.

Ross W. Davidson was first assigned to open another branch laboratory at Fort Collins, Colorado in cooperation with Colorado A&M College in 1951. He was the only pathologist in Fort Collins at that time and set up his office in the Botany and Plant Pathology Department of the College and started on his studies of decays in sub-alpine fir and aspen. In 1957, only six years later, he transferred back to Beltsville to head up the fungus collection and related laboratory work of the Division there.

This brief paragraph fully describes Ross' official, permanent connection with Federal Forest Disease Research in the Southwestern-Rocky Mountain area. But to quit here would surely leave an entirely erroneous impression of his professional career and contributions. Perhaps his career can best be described by saying he spent a disproportionate share of his life commuting between somebody's Washington office and some place in the field, especially in the West.

Ross was a trained mycologist and basically his sole interest was the relationship of fungi to forest tree diseases and wood defects and he worked at it all of his life. He first reported to work in Washington, D. C. in 1928 with John A. Stevenson and Dr. C. L. Shear of the Division of Mycology and Disease Survey on plant diseases. While there, he worked over many of the old specimens sent in by Mr. Bethel who for many years had collaborated with Hedgcock and Long in the Southwest.

His first real contact with forest pathology came in the summer of 1930 when the Division paid his expenses to collect forest fungi out of Grand Junction, Colorado, where among his finds was a new Sclerotinia on willow. Under a similar arrangement he went to Bogalusa, Louisiana in the summer of 1931 to work on and collect blue-staining fungi. In 1932 a similar deal got him to Laurel, Mississippi and somehow on the way back he even managed to stop by Asheville, North Carolina to pick up pathological specimens for future examination.

In the fall of 1932 he was officially transferred to the Division of Forest Pathology, raised from P-1 to P-2, and set to work studying the decays of sprout oaks. In 1933 he combined business and pleasure on another collecting trip west, staying mostly at CCC camps, and stopping at Nebraska shelterbelt nurseries on the way home. While on this trip, he had a look at twig blight of ponderosa pine with Doc Long around the Durango-Denver area. Back in Washington again,

he was assigned to examine the "bushels" of twig blight specimens that were beginning to be sent in from ponderosa pines in the Southwest.

He was on mycological work in Beltsville until 1944 before he was sent west again--this time to collect decay specimens from Sitka spruce and he also got a firsthand look at Poria weirii. In 1945 he examined the beetle-killed spruce area in Colorado with Jim Mielke. In 1949 he worked a bit with Lake Gill in both Idaho and Montana, poking around the roots of pole blight infected white pine trees but finding nothing of significance and inoculating healthy trees with Leptographium. West again in the summer of 1950 to collect fungi from the bug-killed spruce in Colorado.

Now back to the starting point of 1950 when Mr. Davidson was transferred to Fort Collins, only to leave again for Beltsville in 1957. Due to illness in the family his wife didn't move with him on this assignment, so by October 1961 Ross was getting pretty tired of living one place with his family on the other side of the continent. When he found no other recourse open, Ross retired from the Division of Forest Disease Research and hastened back to his family in Fort Collins.

He immediately affiliated himself with Colorado State University and through that means in 1962 was recipient of an NSF grant that lasted for five years. This made it possible for him to buy a camper-trailer and he and his wife traveled around, where, and as they willed, collecting fungi, working on Ceratomyces associated with bark-beetles, and just plain enjoying themselves; probably the happiest five years of their lives.

Mr. Davidson continues to be provided working space in the College of Forestry on the Colorado State University campus where he still shows up for work about as regularly and punctually as any paid employee. There is no visible evidence that the last 20 years have aged him a day. In 1968 his alma mater, Ottawa University, awarded him an honorary Doctor of Science degree.

John P. Daniels came to the Albuquerque Laboratory just after getting his Master's in forest pathology from Yale in 1956. He worked on a variety of projects but mostly on an intensive dwarfmistletoe survey of Arizona and New Mexico and on a red rot study on the Navajo Reservation. In 1958 he transferred to the Bureau of Indian Affairs and soon thereafter decided that he was more interested in keeping people healthy than keeping trees in good health and went on to Stanford University and obtained an M.D. He is now a successful physician on the Flathead Indian Reservation in Montana.

Wally Eslyn was associated with the Albuquerque Lab from 1957 to 1960 and his primary assignments were on drought-associated mortality in the pinyon-juniper type and dwarfmistletoe of ponderosa pine. During this time he also prepared his Ph.D. thesis for publication. This classic paper was one of the first comprehensive studies on the detection of decay in living trees by x-rays. Dr. Eslyn did considerable field work preparatory to a major study for developing genetic resistance to dwarfmistletoe in ponderosa pine. Wally located a number of apparently resistant trees but before the main study got underway he transferred to the Forest Products Laboratory in Madison, Wisconsin where he is now in charge of the "Biodegradation of Wood" unit.

Roger S. Peterson first came to the Division in Fort Collins as a summer assistant, fresh from earning his Master's degree at the University of Michigan. He then went on L.W.O.P. until June 1958 to return to the University of Michigan on a teaching fellowship to work towards his doctoral degree under Dow Baxter. Roger came back to the Station on permanent professional appointment in June 1958 and worked with Drs. Gill and Hawksworth on conifer rusts. Altogether he put in enough licks on western gall rust research in the Rocky Mountains to write his dissertation on it and receive his Ph.D. in 1959. But as it turned out, Roger was another short termmer, moving on (it took considerable urging)

to the Intermountain Station in April 1962 to continue his fine work on the native western rusts. Roger was an outstanding researcher and prolific writer. One of his more important accomplishments while at the Rocky Mountain Station was to pin down the various life stages of the spruce broom rust and to show that Arctostaphylos was the alternate host.

J. W. Riffle joined the Division with headquarters in Albuquerque on July 1, 1962 to work with Paul Lightle who had been alone there for several months. In recent years there had developed an increased decadence and dying of ponderosa pine, and other trees, on the margins of the natural range of the species involved. This was the problem Jerry came to work on. It didn't take too long to recognize that that part of the country was just beginning to emerge from a 10- to 12-year drought period. When there is a drought in an area normally quite arid anyhow, trees show stress rather quickly. Interestingly enough, in conducting his root studies, Jerry soon found that nematodes were also part of the complex; nematodes working on the tree root mycorrhizae.

In the total effort to consolidate the Rocky Mountain Station's research and eliminate the inefficient 1- and 2-man projects insofar as possible, Dr. Riffle was transferred in August 1972 to Lincoln, Nebraska to join the disease of forest environment plantings, Great Plains project, where Dr. Glenn W. Peterson had also been alone for a number of years. Disease work at Albuquerque will likely be phased out when Dr. Lightle retires.

John M. Staley is the latest scientist to have joined the disease research staff at the Rocky Mountain Station, reporting for duty at Fort Collins in September 1962. John was already well experienced before he arrived, much of it having been gained on problems and at places that must have made Fort Collins seem more attractive even than it really is.

Like many foresters who went to college in the West, John pulled ribes for Forest Service blister rust control projects in the summer of 1946. During the summer seasons of 1950 and 1951 he worked for the Division of Forest Pathology under Don Graham out of the Inland Empire Research Center, Spokane, Washington on white pine pole blight surveys, both as an aerial observer and as a ground checker. During 1951 to 1953 he was a graduate assistant at the University of West Virginia working with Dr. Phil True on oak wilt. In 1953 he assisted Dr. Childs on a Poria weirii root rot survey in Oregon. John was in the Army from 1954 to 1956 but spent one year of that time working on stem rust of wheat in the Biowarfare unit at Fort Detrick, Maryland.

As a permanent professional employee of the Northeastern Station he worked on the challenging oak decline problem from 1956 to 1962, getting his doctoral dissertation out of solving that puzzle which turned out to be insect defoliation working in combination with several pathogenic agents. He got a little relief (?) during this work period, however, by drawing a tour of duty at Parsons, West Virginia, working on a variety of problems.

It was from there that he was transferred to Fort Collins where he has been headquartered ever since working on conifer needle diseases and doing an outstanding job of it. Dr. Staley has already become a national authority in that field, having recently been called to solve an unknown foliage problem of southern pines along the Gulf Coast. He has also assisted on the diagnoses of foliage disease problems of ponderosa pine plantations in Oregon and of Scotch pine Christmas tree plantations in the Pacific Northwest and the Lake States. He first worked under Dr. Andrews, but with Stu's retirement he now reports to Dr. Frank Hawksworth as his project leader.

The technical forest disease research staff of the Rocky Mountain Forest and Range Experiment Station now consists of Frank G. Hawksworth, John M. Staley,

and Thomas E. Hinds at Fort Collins, Colorado; Paul C. Lightle at Albuquerque, New Mexico; and Glen W. Peterson and Jerry W. Riffle at Lincoln, Nebraska.

APPENDIX

Hedgcock, George Grant (See also Washington Office)

B.S. University of Nebraska 1899
A.M. University of Nebraska 1901
Ph.D. Washington University (St. Louis) 1906

Publications:

Hedgcock, George G. and W. H. Long

1912. Preliminary notes on three rots of juniper. *Mycologia* 4:
109-114.

and W. H. Long

1913. An undescribed species of Peridermium from Colorado.
Phytopath. 3: 251-252.

and W. H. Long

1914. Identity of Peridermium fusiforme with Peridermium cerebrum.
Jour. Agric. Res. 2: 247-249, illus.

, Ellsworth Bethel, and N. Rex Hunt

1918. Pinon blister-rust. *USDA, Jour. Agric. Res.* 14(10): 411-424,
illus.

Rhoads, Arthur S., George G. Hedgcock, Ellsworth Bethel, and Carl Hartley

1918. Host relationships of the North American rusts, other than
Gymnosporangiums, which attack conifers. *Phytopath.* 8(7):
309-352.

Bethel, Ellsworth

B.S. U. S. Grant University 1886
A.M. (Hon.) University of Denver 1905

Hunt, N. Rex

B.S. Washington State College 1907
M.S. University of California 1909

Bray, W. L.

A.B. University of Indiana 1893
A.M. Lake Forest University 1894
Ph.D. University of Chicago 1898

Publications:

Bray, William L.

1910. The mistletoe pest in the Southwest. USDA, BPI, Bull. No. 166, 39 pp.

Long, William Henry

A.B. Baylor University 1888
A.M. University of Texas 1900
Ph.D. University of Texas 1917

Publications:

Long, W. H.

1915. A new aspect of brush disposal in Arizona and New Mexico. Soc. Amer. For. Proc. 10: 383-398.

1916. Note on western red rot in Pinus ponderosa. Mycologia 8(3): 178-180.

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Korstian, C. F. and Long, W. H.

1922. The western yellow pine mistletoe: Effect on growth and suggestions for control. USDA Bull. 112, 35 pp., illus. (Korstian was Forest Service; authors listed strictly by alphabetical order).

Long, W. H.

1925. Making the cottonwood be neat. Amer. For. & For. Life 31 (375): 144-146, illus.

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1931. Data to be noted in studying heart rots of living trees. Phytopath. 21: 1199-1200. (Still used as a guide by pathologists).

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1941. The durability of untreated oak posts in the Southwest. Jour. For. 39: 701-704.

Ellis, Don Edwin

- A.B. Nebraska Central College 1928
B.S. Nebraska Central College 1929
M.S. (Pl.Path.) Louisiana State University 1932
Ph.D. Consolidated University of North Carolina 1945

Publications:

Ellis, Don Edwin

1939. Conifer diseases hitherto unreported from the Southwest. USDA Pl. Dis. Rpt. 23: 341.

and Lake S. Gill

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1945. A new Rhabdogloeum associated with Rhobdocline pseudotsugae in the Southwest. Mycologia 37(3): 326-332.

Ellis, Don Edwin

1946. Anthracnose of dwarfmistletoe caused by a new species of *Septogloeum*. Jour. Elisha Mitchell Sci. Soc. 62(1): 25-50, 6 plates. (Basically his Ph.D. Dissertation).

McKenzie, Howard L., L. S. Gill, and Don E. Ellis

1948. The Prescott scale (*Matsucoccus vexillorum*) and associated organisms that cause flagging injury to ponderosa pine in the Southwest. USDA Jour. Agr. Res. 76(2): 33-51. Jan. 15.

Gill, Lake S.

A.B.	Stanford University	1923
M.A.	Stanford University	1931
Ph.D.	Yale University	1934

Publications:

Gill, Lake S.

1935. *Arceuthobium* in the United States. Conn. Acad. Arts and Sci. Trans. 32: 111-245. (His Ph.D. dissertation at Yale).

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(Also cited under Don Ellis but repeated here because of its importance in settling a problem and controversy that originated at least 30 years earlier.)

Gill, L. S.

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1957. Dwarfmistletoe of lodgepole pine. USDA For. Serv. For. Pest Leaflet 18, 7 pp.

and Frank G. Hawksworth

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1961. The mistletoes. A literature review. USDA Tech. Bull. 1242, 87 pp.

Andrews, Stuart R.

B.S.	Yale University	1933
M.F.	Yale University	1935
Ph.D.	University of Minnesota	1953

Publications:

Andrews, Stuart R.

1955. Red rot of ponderosa pine. USDA For. Serv., Rocky Mtn. For. and Range Exp. Sta. Agric. Mono. 23, 34 pp.

1957. Dwarfmistletoe of ponderosa pine in the Southwest. USDA For. Serv. For. Pest Leaflet 19, 4 pp.

and Eslyn, Wallace E.

1960. Sooty-bark canker of aspen in New Mexico. USDA Plant Dis. Rptr. 44: 373.

and John P. Daniels

1960. A survey of dwarfmistletoe in Arizona and New Mexico. USDA For. Serv., Rocky Mtn. For. and Range Exp. Sta., Sta. Pap. 49, 17 pp., illus.

Lightle, Paul C. (See also Region 5)

Publications:

Lightle, Paul C., Elizabeth T. Standring, and J. G. Brown

1942. A bacterial necrosis of the giant cactus. Phytopath. 32(4): 303-313.

, Stuart R. Andrews, and William E. Mouser

1967. Recleaning the dwarfmistletoe control area on the Mescalero Apache Reservation, New Mexico. Jour. For. 65: 816-817.

and Stuart R. Andrews

1968. Red rot in residual ponderosa pine stands on the Navajo Indian Reservation. USFS Res. Pap. RM-37, 12 pp., illus.

Hawksworth, Frank G., Paul C. Lightle, and Robert F. Scharpf
1968. Arceuthobium in Baja California, Mexico. Southwestern Naturalist 13:
101-102.

Myers, Clifford A., Frank G. Hawksworth, and Paul C. Lightle
1972. Simulating yields of southwestern ponderosa pine stands,
including effects of dwarf mistletoe. USDA For. Serv.
Res. Pap. RM-87, 16 pp.

Mielke, James L. (See Region 6, Region 5, and Region 4)

No significant publications during this reporting period

Bryan, William C.

B.S. (Pl.Path.) University of Arizona 1941
M.S. (Pl.Path.) University of Arizona 1948

No significant publications during this reporting period

Hawksworth, Frank G. (See also University of Idaho)

B.S. (For.) University of Idaho 1949
MSF Yale University 1952
Ph.D. Yale University 1958

Publications:

Hawksworth, Frank G.
1954. Observations on the age of lodgepole pine tissues
susceptible to infection by Arceuthobium americanum.
Phytopath. 44: 552, illus.

1958. Rate of spread and intensification of dwarfmistletoe in young
lodgepole pine stands. Jour. For. 56: 404-407, illus.

1961. Dwarfmistletoe of ponderosa pine in the Southwest. USDA
Tech. Bull. 1246, 112 pp., illus.

Hawksworth, Frank G.
1965. Life tables for two species of dwarfmistletoes. I. Seed dispersal, interception, and movement. For. Sci. XI: 142-151, illus.

_____ and D. Wiens
1970. Biology and taxonomy of the dwarfmistletoes. Annual Rev. Phytopath. 8: 187-208.

_____ and D. Wiens
1972. Biology and classification of dwarfmistletoes (Arceuthobium). For. Serv., USDA, Agric. Handbook No. 401, 234 pp., illus.

Hinds, Thomas E.

B.S. (Arts & Sci.) Colorado State University 1958

M.S. (Pl.Path.) Colorado State University 1968

Publications:

Hinds, Thomas E., Frank G. Hawksworth, and Ross W. Davidson
1960. Decay of subalpine fir in Colorado. USDA, For. Serv., Rocky Mtn. For. and Range Exp. Sta. Pap. 51, 13 pp.

_____, Frank G. Hawksworth, and W. J. McGinnes
1963. Seed discharge in Arceuthobium: A photographic study. Science 140: 1236-1238, illus.

_____ and Frank G. Hawksworth
1965. Seed dispersal velocity in four dwarfmistletoes. Science 148: 517-519, illus.

_____, F. G. Hawksworth, and Ross W. Davidson
1965. Beetle-killed Engelmann spruce, its deterioration in Colorado. Jour. For. 63(7): 536-542.

_____ and F. G. Hawksworth
1966. Indicators and associated decay of Engelmann spruce in Colorado. USFS, Rocky Mtn. For. and Range Exp. Sta. Res. Pap. RM-25, 15 pp., illus.

Hinds, Thomas E. and R. W. Davidson

1967. A new species of Ceratocystis on aspen. *Mycologia* 59: 1102-1106.

1972. Ceratocystis canker of aspen. *Phytopath.* 62: 213-220, illus.

and R. W. Davidson

1972. Ceratocystis species associated with aspen ambrosia beetle. *Mycologia* 64: 405-409.

1972. Insect transmission of Ceratocystis species associated with aspen cankers. *Phytopath.* 62: 221-225.

Davidson, Ross W.

B.S. (Biol.) Ottawa University (Kansas) 1927
M.S. (Mycol.) University of Iowa 1928
D.Sc. (Hon.) Ottawa University (Kansas) 1968

Publications:^{1/}

Davidson, Ross W. and Edith K. Cash

1933. Species of Sclerotinia from Grand Mesa National Forest, Colorado. *Mycologia* 25: 266-273, illus. July-Aug.

, W. A. Campbell, and Dorothy Blaisdell Vaughn

1942. Fungi causing decay of living oaks in the Eastern United States and their cultural identification. USDA Tech. Bull. 785, 65 pp. (See 1918 publication of Long and Harsch)

and James L. Mielke

1947. Fomes robustus, a heart rot fungus on cacti and other desert plants. *Mycologia* 39: 210-217.

^{1/} Ross' cited publications do not coincide by date with his period of assignment at Fort Collins for the work of a mycologist can be done most anywhere, at any time, and be of far ranging interest. Those publications which are cited do, however, give a good cross section of his many works.

Davidson, Ross W. and Frances Lombard

1954. Brick red stain of Sitka spruce and other wood substrate.
Phytopath. 44: 606-607.

1955. Wood-staining fungi associated with bark beetles in
Engelmann spruce in Colorado. Mycologia 47: 58-67.

and Edith K. Cash

1956. A Cenangium associated with sooty-bark canker of aspen.
Phytopath. 46: 34-36.

and Thomas E. Hinds

1956. Hypoxylon canker of aspen in Colorado. USDA Plant Dis.
Rept. 40: 157-158.

and T. E. Hinds

1958. Unusual fungi associated with decay of forest trees in Colorado.
Phytopath. 48: 216-218.

, Thomas E. Hinds, and Frank G. Hawksworth

1959. Decay of aspen in Colorado. USDA For. Serv., Rocky Mtn.
For. and Range Exp. Sta. Pap. 45, 14 pp.

, Paul K. Lentz, and Hazel H. McKay

1960. The fungus causing pecky cypress. Mycologia 52: 260-279.
(See von Schrenk 1899 publication under Private Industry)

1971. New species of Ceratocystis. Mycologia 63: 5-15.

Daniels, John P.

BSF Michigan Tech. 1955

M.F. Yale University 1956

Publications:

Andrews and Daniels. 1960. (See under S. R. Andrews)

Eslyn, Wallace E.

BSF	University of Montana	1950
M.S.	(For.Path.) University of Montana	1953
Ph.D.	(For.Path.) Iowa State University	1956

Publications:

Eslyn, W. E.

1959. Radiographical determinations of decay in living trees by means of the thulium x-ray unit. *Forest Science* 5: 37-47.

1959. Hemerocampa pseudotsuga McDunnough, a new host for Beauveria bassiana (Balsamu) Vuillemin. *J. Insect Pathol.* 1: 434-435.

1960. New records of forest fungi in the Southwest. *Mycologia* 52: 381-387.

Andrews and Eslyn. 1960 (See under S. R. Andrews).

Peterson, Roger S. (See also Intermountain)

A.B.	(Biol.) Harvard University	1953
M.A.	(Bot.) University of Michigan	1957
Ph.D.	(Bot.) University of Michigan	1959

Publications:

Peterson, Roger S.

1959. Western gall rust in the Rocky Mountains. Dissertation Abstracts 20(5): 1557. Also RAM 39(10): 636.

1960. Western gall rust on hard pines. USDA For. Serv., For. Pest Leaflet 50, 8 pp.

Peterson, Roger S.

1961. Host alternation of spruce broom rust. *Science* 134(3477): 468-469.

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1962. Comandra blister rust in the Central Rocky Mountains. USDA For. Serv., Rocky Mtn. For. and Range Exp. Sta. Res. Notes 79, 6 pp.

Riffle, Jerry W.

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| B.S. | Michigan State University | 1957 |
| M.S. | Michigan State University | 1959 |
| Ph.D. | University of Wisconsin | 1962 |

Publications:

Riffle, Jerry W.

1963. *Meloidogyne ovalis* (Nematoda: Heteroderidae), a new species of root knot nematode. *Helminthol. Soc. Wash. Proc.* 30: 287-292.

and D. P. Lucht

-
1966. Root-knot nematodes on ponderosa pine in New Mexico. USDA, Plant Dis. Rept. 50: 126.

-
1967. Effect of an *Aphelenchoides* species on the growth of mycorrhizal and a pseudomycorrhizal fungus. *Phytopath.* 57: 541-544.

-
1968. Plant-parasitic nematodes in marginal *Pinus ponderosa* stands in central New Mexico. USDA, Plant Dis. Rept. 52: 52-55.

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1971. Effect of nematodes on root-inhibiting fungi. pp. 97-113. In *Mycorrhizae*, ed. by E. Hacskeylo. USDA Misc. Pub. 1189, 255 pp.

Staley, John M.

B.S.	(For.) University of Montana	1951
M.S.	(Pl.Path.) University of West Virginia	1952
Ph.D.	(Pl.Path.) Cornell University	1962

Publications:

Staley, John M.

1964. A new Lophodermium on ponderosa pine. Mycologia 56(5): 757-762. Sept.-Oct.

1964. A survey of coniferous foliage diseases (other than rusts) in Colorado. USDA, Plant Dis. Rept. 48: 562-563.

1965. Scleroderris canker of subalpine fir in Colorado. USDA, Plant Dis. Rept. 49: 882.

1967. Bifusella crepidiformis on Engelmann spruce. USDA, Plant Dis. Rept. 51: 791-792.

Czabator, F. J., J. M. Staley, and G. A. Snow

1971. Extensive southern pine needle blight during 1970-71 and associated fungi. USDA, Plant Dis. Rept. 55(9); 764-766.

Staley, John M. and Bynum, H. H.

1972. A new Lophodermella on Pinus ponderosa and P. attenuata. Mycologia 64(4): 722-726. July-Aug.

COLORADO STATE UNIVERSITY

Fort Collins

Forest Pathology as a listed course has been offered at Colorado State University (formerly Colorado A&M) since 1927. Prior to that time a special section of a course in Plant Pathology was taught for foresters. Forest Pathology is offered in the Department of Botany and Plant Pathology (Department of Botany prior to 1946).

An advanced course in Forest Pathology was begun by Dr. N. Oshima in 1968. Graduate work in forest pathology began in 1951. The first Master's degree in forest pathology was granted in 1953 and the first Ph.D. in this field in 1972.

Related research and graduate work has also been conducted in the Department of Forest and Wood Science at Colorado State University, particularly in the area of forest products pathology, mycorrhiza and physiological aspects of tree diseases. Dr. Ross Davidson has been a research associate in this Department working on staining fungi since his retirement from the U. S. Forest Service in 1961 (See Rocky Mountain Station). Dr. C. C. P. Reid has conducted intensive studies on mycorrhiza since coming to C.S.U. in 1969.

Forest disease studies in both departments are conducted in cooperation with the U. S. Forest Service, Rocky Mountain Forest and Range Experiment Station and the Colorado State Forest Service.

To date about 20 advanced degrees in the area of tree or forest pathology have been awarded by both departments in such diverse subjects as needle casts, cankers, air pollution, decays, gall rusts, dwarfmistletoes, Dutch elm disease, and mycorrhiza. Only one graduate, however, has continued on in forest disease research in the West.

A chronological list of professors and the approximate dates in which they taught forest pathology at CSU is given below:

1927 - 1929	L. W. Durrell
1929 - 1937	E. C. Smith
1937 - 1945	Junius Forsberg
1946 - 1955	W. D. Thomas
1955 - 1957	Carl E. Seliskar
1957 - 1962	Les E. Dickens
1962 - 1965	W. A. Kreutzer and N. Oshima
1965 - date	N. Oshima

Of these former professors, only Dr. Seliskar has continued on in forest disease research. When he left CSU in 1957 he joined the Forest Service's disease laboratory, now at Delaware, Ohio, where he leads a project in vascular diseases of trees with emphasis on possible virus involvement.

Dr. Oshima works more and more closely with Forest Service pathologists and at least two papers of joint authorship are now in manuscript.

APPENDIX

Seliskar, Carl E.

BSF University of Washington 1942
Ph.D. (Pl.Path.) Cornell University 1950

Students:

Thomas E. Hinds

Publications:

Seliskar, Carl E.

1952. Wetwood organism in aspen, poplar is isolated. Farm and Home Research (Colo. Agr. Expt. Sta.) 2(6): 6-11, 19-20.

Oshima, Nagayoshi

B.A. (For.) Tokyo University 1951
M.S. (Bot. & Pl.Path.) Colorado State University 1953
Ph.D. (Pl.Path.) University of Minnesota 1957

Students:

Thomas E. Hinds

Publications:

Oshima, N., and J. K. Beagley

1967. Physiology of sporophore formation in Trametes hispida. J. Colo.-Wyo. Acad. Sci. 5(8): 67. Abstract.

Laut, J. G., N. Oshima, and L. E. Dickens

1969. The recurrence of Dutch elm disease in Colorado. Pl. Dis. Rept. 52: 253.

Dickens, L. E., N. Oshima, and S. R. Andrews

1970. Distribution of Dutch elm disease in Colorado, 1969. Pl. Dis. Rept. 54: 266-267.

THE UNIVERSITY OF ARIZONA

Tucson, Arizona

By 1937 at the latest, the rudiments of forest pathology were being taught at The University of Arizona. At that time, Dr. R. B. Street, who had arrived on campus in 1924 as assistant professor of plant pathology was teaching Plant Pathology 165, Diseases of Forest Trees, Shade Trees, and Ornamentals. Dr. James G. Brown, who joined the faculty in a similar capacity shortly following Dr. Street, was teaching Plant Pathology 175, Elementary Forest Pathology. Dr. Brown got involved in research on the dying of the saguaro cactus in the mid-forties and he and his graduate students were the first to isolate and get into pure culture the causal bacterium. This could well be considered the first attempt at forest disease research at the university. At least three graduate students worked with Dr. Brown on this problem in cooperation with the Office of Forest Pathology. Two of these students, Lightle and Bryan, are still in Federal forest disease research.

When Dr. Keener arrived on the campus in 1945 as assistant professor of plant pathology and assistant pathologist in the state experiment station, because of his background experience, he took over the instruction in forest pathology. He advanced through the ranks and in 1959 was named full professor. Although trained primarily as a mycologist and forest pathologist, he also became involved in solving both basic and applied disease problems of importance to Arizona agriculture. As a forest pathologist, he made many contributions to the knowledge of needle cast and rust fungi of Arizona conifers. He, too, cooperated very closely with Federal forest pathologists in the Southwest on these problems. Paul had a special interest in and studied the occurrence of microorganisms in supposedly healthy plant tissue with particular reference to the buds of woody

plants. Under his direction the mycological herbarium of the Arizona Agricultural Experiment Station developed into one of the best reference collections in the Southwest.

Paul devoted his life to scholarly pursuits and service to others. His research was characterized by meticulous attention to detail. A similar degree of thoroughness was apparent in his teachings, and the high standards he set for himself were expected of his students and colleagues. Dr. Keener died unexpectedly on August 6, 1966 in Tucson, Arizona of a heart attack.

To replace Dr. Keener, the university officials selected Dr. Robert L. Gilbertson who was then teaching at Syracuse University and had had five years of prior forest pathology teaching experience at the University of Idaho. When Bob reported for duty in July 1967 he brought with him a wealth of experience in teaching forest pathology and a special interest in the decay fungi and fungal taxonomy which will surely be to the benefit of all who take his courses or work with him on his research program. Dr. Gilbertson continues to cooperate very closely with Federal pathologists at Beltsville, Maryland on mycological problems and at Madison, Wisconsin on the fungus pure culture collection and, of course, directly with those working also in the Southwest and Rocky Mountains.

APPENDIX

Street, Robert Burley

B.S.	Montana State College	1918
M.S.	University of Wisconsin	1922
Ph.D.	University of Wisconsin	1924

Brown, James Greenlief

B.S.	University of Chicago	1916
M.S.	University of Chicago	1917
Ph.D.	University of Chicago	1925

Students:

Paul C. Lightle
William C. Bryan

Publications:

Lightle, Paul C., Elizabeth T. Standring, and J. G. Brown

1942. A bacterial necrosis of the giant cactus. *Phytopath.* 32(4):303-313.

Keener, Paul D.

B.S.	Pennsylvania State College	1932
M.S.	Pennsylvania State College	1934
Ph.D.	Pennsylvania State College	1945

Publications:

Keener, Paul D.

1951. An ascigerous stage of *Darluka filum* (Biv.) Castagne.
U. S. Dept. Agr. Plant Dis. Rept. 35: 86-87.

1953. A species of *Gymnosporangium* on quince, pear, and hawthorne
in Arizona. U. S. Dept. Agr. Plant Dis. Rept. 37: 235.

Keener, Paul D.

1956. Two fungi associated with a microcyclic rust, Coleosporium crowellii Cummins, on needles of Pinus edulis Engelm. in Arizona. Madrono 13: 189-195.

Gilbertson, Robert L. (See also University of Idaho)

- B.A. (Bot.) Montana State University 1949
M.S. (Bot.) University of Washington 1951
Ph.D. (Pl.Path.) College of Forestry at
New York State University 1954

Students:

Sieglinde Neuhauser
Kenneth Martin

Page Lindsey
Douglas Rhodes

Publications:

Gilbertson, R. L.

1969. A new species of Inonotus on southwestern sycamores. Southwestern Naturalist 14: 123-125.

and A. B. Budington

1970. New records of Arizona wood-rotting fungi. Jour. Ariz. Acad. Sci. 6: 91-97.

, F. F. Lombard, and R. W. Davidson

1972. Studies of two species of Phellinus in western North America. Mycopath. et Mycol. Appl. 46: 351-365.

and H. H. Burdsall

1972. Phellinus torulosus in North America. Mycologia 64(6): 1258-1269.

and E. R. Canfield

1972. Poria carnegiea and decay of saguaro cactus in Arizona. Mycologia 64: 1300-1311.

REGION 6

PACIFIC NORTHWEST FOREST & RANGE EXPERIMENT STATION

It was 1920 before the fourth and last of the regional Consulting Pathologist was assigned to Region 6 with headquarters in Portland, Oregon. Perhaps the extensive old-growth timber stands of Washington and Oregon seemed inexhaustable so no need to worry about disease problems. Perhaps, too, it was the grave menace of white pine blister rust to the West as recognized by the War Emergency Board of American Plant Pathologists in their Madison conference in June 1918 that prompted action to be taken even then. As a followup, under the leadership of H. P. Barss of Oregon Agricultural College, as Commissioner for the West for the Advisory Board of American Plant Pathologists, an International White Pine Blister Rust Conference for Western North America was held in Portland, Oregon on April 23-24, 1919. Members at this conference were apprised of the threat of white pine blister rust moving in from the East and they passed resolutions to forestall this happening, including quarantines, increased funds for research, and close cooperative efforts at all levels. Federal pathologists attending this meeting included Dr. Haven Metcalf, in charge of the Federal Office of Forest Pathology, Dr. Meinecke from the San Francisco office, Dr. Weir from the Spokane office, and Dr. Long from Albuquerque. It has to be more than coincidental that the Portland office was opened the following year.

On March 1, 1920, Dr. John S. Boyce was moved up from San Francisco, where he had been assisting Dr. E. P. Meinecke for several years, to open the regional office of Forest Pathology as Consulting Pathologists in Charge. His first research effort was to make a study of the heart rots affecting the old-growth Douglas-fir stands. With the discovery of white pine blister rust on Ribes nigrum at Vancouver, B. C. in the fall of 1921, a whole new appraisal of research

priorities was mandatory. As it turned out, the rust had been introduced on white pine planting stock shipped in from Ussy, France in 1910, and set out in a nursery at Point Grey, B. C. Thus, the fears expressed at the International White Pine Blister Rust Conference were realized, not by overland spread from the East, however, but by flanking action and separate invasion of the West. As a consequence, Harry G. Lachmund, another of Meinecke's assistants since 1919, was brought up in 1922 to assist Boyce and generally to direct a blister rust research program.

Boyce continued his decay studies and maintained overall direction of the rust program. In 1926 he conducted a detailed study of the progress of decay in the windthrown timber on the Olympic Peninsula that had blown down in the big storm of January 29, 1921, thus providing operators with valuable leads as to time available for salvage operations.

Dr. Boyce resigned on March 1, 1928, after eight years to the day of pioneering effort, to become director of the Northeastern Forest Experiment Station at Amherst, Massachusetts. He was there but one year when he went to Yale University to become their first Professor of Forest Pathology. In 1938 he published his textbook of Forest Pathology, a book that was to undergo two subsequent revisions. He retired from Yale in 1958 and died on March 20, 1971.

Despite Boyce's fine abilities as a research scientist and administrator, probably his most lasting contribution, not neglecting his textbook, was his training of pathologists at the graduate level while at Yale. During his 30 years there, he directed the studies of 33 M.F. students and 22 Ph.D.'s in forest pathology, from all parts of the world, including many who continued on to positions of responsibility, a number of them in the West.

Two of Boyce's and Lachmund's earliest summer assistants on blister rust studies, working in British Columbia, should be mentioned at this time. Warren V. Benedict worked only the summer of 1924 and then went into Blister Rust Control

in Spokane and rose through the ranks eventually to head up all such work in the West, later nationally, and finally in 1955 he was placed in charge of the Division of Pest Control in the Washington Office of the Forest Service, a position he held until retirement on December 31, 1966. Ezra M. Hornibrook was also in on the early work in British Columbia as a summer assistant in 1925 and 1926. He is mentioned, because on September 7, 1927, after moving over to Blister Rust Control, he found the first white pine blister rust on Ribes (petiolare) in the Inland Empire near Colville, Washington. (According to Ezra, it was but a couple weeks later that one Mark Edmonds found the first rust canker on western white pine near Priest Lake, Idaho.)

When Lachmund arrived in Portland in 1922 he unknowingly got in on the ground floor of one of the most intensive forest disease research efforts ever conducted in the West. To his everlasting credit, he foresaw the critical points needing clarification because of possible differences between eastern and western behavior of white pine blister rust. Over the next few years, as funds permitted, he put together a team of vigorous young men who carried out his planned program. Harry also continued active research of his own for a time, but when Dr. Boyce resigned in 1928, he was appointed his successor and spent more and more of his time on administrative affairs thereafter.

It is unfortunate that a man of Lachmund's brilliance was unable to conform to established standards of conduct and found it necessary to resign in July of 1935. Thereafter Harry had a summer or two of work with Blister Rust Control in California and in 1941 a brief assignment at the Forest Products Laboratory in Madison. Current information is that for many years he has been City Forester and operator of a pest control business in Carmel, California, his original home territory.

James L. Mielke came on as a summer assistant in 1924 and 1925 and received his permanent appointment in 1926. Except for time out in 1932-1933 to put in his residence requirements for his Master's degree at Oregon State, he was a member of the Portland staff until transferring to the San Francisco office in 1935.

Clyde N. Partington joined the staff about 1928. His academic background is unknown, but he came from Massachusetts. He left the unit about 1930 and went eventually into Plant Quarantine inspection work, and then to a CCC assignment in Missouri. He died at a relatively early age.

C. J. Nusbaum had summer employment assisting Lachmund and others in British Columbia in 1927 after his sophomore year at Oregon State. That fall he had to drop out of school because of appendicitis, so he went back to work in Portland in 1928 and stayed on through the summer. He started the work on the age of susceptibility of ribes leaves in the Kelowna swamp. He graduated from Oregon State in 1929 and in March 1930 he left Portland for graduate work at Wisconsin. After various work experiences, including the Washington Office on chestnut blight studies during the summer and fall of 1934, he ultimately joined the faculty at North Carolina State University where, since 1956 he has been the William Neal Reynolds Distinguished Professor of Plant Pathology.

James W. Kimmey first came to work on temporary appointment as an Agent in the spring of 1928 and then mixed periods of work with periods of schooling until completing his Master's at Oregon State in 1932 and getting his permanent appointment in 1935. He took off again in 1937-38 to put in his residence at Yale for his doctorate degree which he received in 1940 and then in 1941 he transferred to San Francisco.

Thomas S. Buchanan reported for work only a few days after Kimmey in June 1928. He was but a mid-year sophomore at Idaho so also gained a temporary appointment as an Agent until getting his Bachelor's degree and permanent appointment

in 1935. He went on leave again in 1936-37 for graduate study at the University of California. In August 1939 he left once more for doctoral residence work at Yale and never returned to the Portland office. He did show up in the West again, however, after working four years on littleleaf in the Southeast and serving two years in the Marine Corps, first with the Weyerhaeuser Timber Company at Longview, Washington in 1946 and a couple years later on the faculty at the University of Idaho.

Thomas W. Childs started as a permanent employee after graduating from OAC in 1929 although he had stayed out of school for six months in 1927 and assisted Dr. Boyce in his Douglas-fir decay studies computations. He took off in the fall of 1933 for graduate study in Philadelphia but returned to Portland after getting his doctoral degree in 1936. Then from 1943 to 1945 he sat on Pacific islands in an army uniform, mostly as executive officer of an antiaircraft battery, but never a plane to shoot at. Except for the above respites, "Toby" spent his entire professional career in the Pacific Northwest, a rare and happy accomplishment! He replaced J. L. Bedwell as Division Chief when the latter retired on January 31, 1958. When the Pacific Northwest Station reorganized into the Assistant Director system in 1964, Toby elected not to move to Corvallis. Dr. Childs stepped down at that time, relinquishing all administrative responsibilities, and occupied his time most constructively in technical writing until retirement in 1968.

William F. Cummins was another intermittent Agent added to the staff in 1929. He received his B.S. in Forestry from Oregon State in 1931 and then left Portland in May 1933 by transfer to the BRC program in Idaho. Bill eventually followed a career in National Forest administration and rose to a position of national prominence as Fire Trespass and Law Enforcement Officer in Region 6.

Alan A. McCready also joined the crew in the summer of 1928 and worked intermittently between periods of schooling at Oregon State until 1933 when sufficient research funds failed to come through and he was released. Details of his schooling and employment are not readily available but it is known that he, too, found a career in National Forest administration in the West.

John R. Hansbrough was detailed to Portland by Dr. Metcalf for a couple years in 1930 and 1931 to gain some western experience. He returned to the East (New Haven, Connecticut) and in 1955 succeeded Dr. Lee M. Hutchins, retired, as Director of the Division of Forest Disease Research. He held this Forest Service Washington Office position until retirement in 1967.

The above men, especially Lachmund, Mielke, Partington, Nusbaum, Kimmey, Buchanan, Cummins, McCready, and to a lesser extent, Childs and Hansbrough, assisted at various times by various temporaries too numerous to mention, were primarily responsible for the thorough research on white pine blister rust in the Pacific Northwest. The field research was conducted originally in British Columbia because that was where the rust was to be found and the Canadians at that time seemed more concerned with their black currants (the source of currant jam and currant wine) than with their coastal white pines. As the rust moved south and became firmly established in Washington, Idaho, and Oregon, studies were moved there as opportunity afforded.

Although these men worked more or less across the board on white pine blister rust research, each also had areas of primary responsibility. Mielke had the interior of British Columbia and was responsible for keeping track of spread of the rust. Partington had the coastal area and Vancouver Island. Buchanan had the Hunter's Siding (and later Idaho) spread plots; Cummins looked after the Hall and Apex spread plots near Nelson, B. C.; while Kimmey and Nusbaum looked after the ribes studies. Later, Kimmey had responsibility for spread

plot studies near Revelstoke and in the Birkenhead, B. C. and at Odell Lake and the Siskiyou in Oregon. McCready, and all the rest of the crew, spent variable amounts of time on the Revelstoke plot. Their publication records will show who did what.

But the publication record does not show that the work in B. C. entailed leaving Portland for the field as soon as the snow was off in the spring and staying until it returned in the fall! While this may have been ideal for the single men, it was a bit of a hardship on the married men--at least the more conscientious ones in that category. Nor does it show that it meant planning a full summer's detailed itinerary in the spring because of the only weekly, or biweekly, at best, schedules of trains, boats, and buses--commercial airlines being unknown in those days. Nor does it show the back pack trips, the pack horse trips, and the camping and eating your cooking that was all accepted as part of the job in those days. It doesn't show that Mielke would stop to wet a fly any time he came to a stream he couldn't spit across. Nor that Partington was deathly afraid of the grizzly bears he encountered in the Birkenhead Mountains of British Columbia, and that he practiced impromptu tree climbing just in case. Neither does it show that he never made a travel connection in his life without running for it. Perhaps the key to his failure to publish lay in the fact that he kept all of his field notes on the margin of last week's newspaper or yesterday's lunch sack. Nor does it show that fun was had, too, by this group of "Yankee Buggers" spending the summer in various small towns in British Columbia and later in Idaho. No mention is made of the fact that Nusbaum was nicknamed "Kuppenheimer" because he liked to wear fine clothes to impress the girls when in town even if he had to borrow them from his friends (either the clothes or the girls!). It doesn't show that Bill Cummins once assisted the British Columbia police in subduing Dukhobor protest marchers

(in the raw) with portable fire pumps loaned by the British Columbia Forest Service. Nor that Mielke, Kimmey, Nusbaum, and McCready were once deputized by the Northwest Mounted Police to participate in a surprise night raid for opium in the Chinatown section of Kelowna. It doesn't show that weekend relaxation was to climb Mt. Begbie out of Revelstoke or Mt. "McAna" near Hunter's Siding. Neither does it show that McCready and Buchanan, as catcher and pitcher, respectively, could field a winning softball team most any place they stopped. It fails to show the "games" played with Lolli, the female bear that hung around the Revelstoke plot. Nor does it show the many friendships made and the wonderful hospitality of the DuMont family where so many spent so much time at Hunter's Siding, British Columbia.

But Kimmey, Buchanan, Childs, and Hansbrough didn't spend all their time on blister rust studies, especially in later years. Kimmey started work on the deterioration of fire-killed timber following the big Tillamook Burn of 1933 and this was the subject of his doctoral dissertation. When he returned from his residence at Yale, he completed this work then started on a study of the defects in airplane spruce. George Englerth helped him on this and their work took them up and down the coast wherever mills were cutting this stock and increased recovery from three to nearly ten percent of the spruce cut. In 1934, despite the absence of even a Bachelor's degree, Buck was selected to handle the twig blight of ponderosa pine scouting in Washington, Oregon, Idaho, and Montana as part of a west-wide effort. More about this in the Region 3 coverage. Suffice to say here that of the other seven men on Buck's crew, only George A. Newton from the Puyallup branch of the Washington State Agricultural Experiment Station had had any pathological experience and Kenneth F. Baker, a fresh Ph.D. out of Washington State College was the only other one to continue on in the field of plant pathology. Buchanan also directed the 1936 reexamination of the Olympic Blowdown. Crew

headquarters for this arduous assignment (before the days of the chain saw) was Forks, Washington; perhaps the only town in the world where men killed on logging jobs during the day were buried at night so their buddies could attend their funeral without missing even one hour's work. In 1938 Buck was detailed to California (Region 5) for the summer on blister rust studies.

Buchanan and Kimmey were the first to find blister rust on native sugar pine--in southern Oregon in 1936 (and Buck was "delayed" several hours taking a "shortcut" back to civilization thereafter).

Hansbrough assisted Childs in his slash decay studies in western Oregon in 1931 and Childs continued on from there to work on needle blight of ponderosa pine, the dwarfmistletoes, and on the root rot caused by Poria weirii. Toby became almost as famous for his P-O-R-I-A W-E-I-R-I-I!!! mating call as for his prowess as a golfer, bridge player, and beer drinker.

Royale K. Pierson was added to the staff in 1933, being paid from CCC funds, but he never came near Portland headquarters. Riley worked at Moscow, Idaho where he had just received his Master's degree from the University of Idaho and was involved entirely with white pine blister rust studies, especially with the susceptibility of ribes leaves and pine needles of different ages. He left the office in 1936 to become Idaho State Extension Forester until 1943, but after a variety of interim experiences was placed in charge of the Soil Moisture and Range Improvement, and Halogeton Control Program of the Bureau of Land Management. Riley held this position until June 4, 1958 when he was killed instantly in a grinding encounter between his car and a truck-trailer rig on the outskirts of Washington, D. C.

Jesse L. Bedwell was transferred to Portland in 1934 from the Washington Office where he had been working on various aspects of the chestnut blight problem. Jesse had prior western experience, however, both as a forest ranger and a

grazing technician. Bedwell soon found himself in charge of the work in Region 6 because his predecessor Harry Lachmund resigned on July 11, 1935. Dr. Metcalf named him as his successor. Jess got personally involved very little in research thereafter, electing instead to make a career of research administration. He remained in charge, however, until he retired on January 31, 1958, to his home in Portland. In the interim, Division headquarters were moved in 1954 from the "new" Post Office Building at Broadway and Glisan Streets where they had been with the Regional Office since the beginning in 1920, to share quarters with their new compatriots, the Pacific Northwest Forest and Range Experiment Station. Jess died February 7, 1969.

George H. Englerth was the next addition to the permanent staff, in 1934. He arrived a little late to get deeply involved in blister rust work but instead helped Kimmey on his fire-killed timber and airplane spruce studies and he and Kimmey helped Buchanan on the Olympic Blowdown. They also assisted Childs on the studies on the Necanicum and Cascade Blowdowns. From 1935 to 1940 Englerth headed up his own study on the decay of west coast hemlock, dissecting a total of 801 trees. Buchanan and Tryon assisted him on this at times in 1937 and Kimmey and Childs helped at other times. This study provided the basis for George's doctoral dissertation. During the war years, George transferred to the Forest Products Laboratory and became involved in wood utilization research, spending a number of years in Puerto Rico in this kind of work. He returned to the Laboratory and retired from there in recent years, still living in the general area.

Earl H. Tryon joined the staff in 1937 and got in on the tail end of some of the rust research in Idaho, then assisted on some of the blowdown and hemlock decay studies, and worked on nursery diseases. Gus was a nephew of Dr. Haven Metcalf and a real downeasterner from Maine. The move from Portland, Maine to Portland, Oregon was quite a transition but not nearly as traumatic an experience

as was his first Saturday night in Pierce, Idaho. There's just no way to beat a drunk Indian in a poker game, nor an upstairs gal shooting pool downstairs! While working in Portland, Gus took time out to earn his Master's degree at OSC, then after getting his Ph.D. at Yale, he went to the University of West Virginia where he is now Professor of Silviculture in the School of Forestry.

This just about marks the end of an era of forest disease research in Region 6 when the primary effort had been devoted to white pine blister rust. From this point on, attention has been directed to a variety of problems concerned with more or less endemic forest tree diseases.

Here is perhaps an appropriate place to recognize Mrs. San Brace, Miss Otelia Krogness (Mrs. H. C. Hulett), and Mrs. Zella Manwarren who successively filled not only the essential role of clerk-stenographer, but also that of traveler's aid, housing authority and, yes, at times, even as a dating bureau!

Ernest Wright joined the staff in 1942; really the first addition who was already fully educated and widely experienced as a pathologist. He had worked for Meinecke for a number of years in California, after previous experience as a forest assistant and as a sawmill hand. He left San Francisco in 1935 to head up the shelterbelt pathology research in the Great Plains and came from there to Portland.

While in Portland he worked on war projects such as stains and decays in products for the duration. He also became involved in nursery diseases, the deterioration of beetle-killed timber, and the relation of logging injuries to the decay of western hemlock and Sitka spruce. He spent the summer of 1943 on preliminary cull studies in Alaska. He participated along with Marvin Fowler in the pole blight aerial surveys in north Idaho in 1949. Ernie was assisted on some of his decay studies for about six months in 1943 by A. S. Rhoads who had made periodic appearances on the Federal forest pathology scene at various

places and at various times from 1917 to 1946. Ernie retired in 1957 and went directly to the Oregon Forest Products Laboratory at Corvallis.

Joe W. Clark joined the Portland staff in 1949 but took two years off for graduate study at Yale and then left in 1953 for the Forest Products Laboratory at Madison where he could better pursue his interest in products pathology.

George M. Harvey was next to join the crew, arriving in December 1953 when only Bedwell, Childs, and Wright were on the permanent staff. George came in by transfer from Gulfport, Mississippi, where he had been working on pulpwood storage problems for the old Division of Forest Pathology. He at first assisted everybody needing help, working across the board on Elytroderma deformans, decays, dwarfmistletoes, and nursery diseases. In the 1962 reorganization of Forest Service Research, he moved to Corvallis and worked in the Pathology of Forest Regeneration project which Childs directed from Portland. Struggling under a certain degree of adversity, George has been working toward a Ph.D. at Oregon State ever since moving to Corvallis. Happily, it appears he is about to complete the goal he set for himself, working on "Lophodermella morbida on off-site ponderosa pine in western Oregon" as his dissertation problem. In 1966 Keith Shea came to Corvallis as project leader but he went on to the Washington Office in June 1971 and was replaced in May 1972 by James L. Stewart.

John Hunt, a native of Bellingham, Washington, was added to the staff in 1954. John came to the Station from the New York State College of Forestry and had three or four years of war time Navy flying behind him. He was an exceptional mycological scholar and research worker who had straightened out the taxonomy and nomenclature of the genus Ceratocystis for his Ph.D. dissertation. John resigned in the late summer 1958 to accept a Yale appointment as successor to John S. Boyce who had just retired. While driving back toward New Haven alone in his car he was waylaid, robbed, and murdered along a highway near Bliss, Idaho

on August 24. (Two men and a woman were implicated; one of the men was later acquitted of murder by an Idaho jury but sentenced to 25 years at hard labor for armed robbery. The woman and the other man were convicted of other crimes in other states.)

Paul E. Aho joined Bedwell, Childs, Wright, Hunt, and Harvey in Portland in June 1957 coming straight from Yale University. For his first year or two he followed the usual routine of general assistant but in 1959 he began to assume responsibility for research on decays of upper slope species. He, too, moved to Corvallis in 1966 where he still works on this problem but is soon to redirect his main thrust toward the dwarfmistletoes. Paul is another to take advantage of his Corvallis location and expects to receive his Ph.D. next year on Decays of White Fir in Rogue River National Forest under Dr. Roth.

Kenneth W. Krueger started work the same day in 1957 as did Paul Aho, but on August 25, 1957 he transferred to Forest Management Research at Corvallis where he studied tree physiology and soils under Dr. W. K. Ferrell of Oregon State. When he received his Ph.D. degree he joined the Forestry Sciences Laboratory where he worked for the Forest Service until his untimely death in 1969. Ken, the son of a Forest Supervisor, was an outstanding student and science lost a valuable candidate at his death.

Earl E. Nelson started as a summer assistant under Dr. Bedwell but in the fall of 1957 received his permanent appointment. He was on an adjusted work week while studying for his doctoral degree at OSU in Corvallis. In 1961 he moved back to Portland but in 1963 reversed the process and returned to Corvallis to join the Soil Microbiology project. He has been there ever since, having worked at various times under Bedwell, Childs, Zak, and finally Trappe. This primary assignment has been on Poria weirii and his doctoral dissertation at OSU under Professor Roth was on this problem. He worked more or less across the

board with Dr. Childs, but since working with Trappe has been able to concentrate on the root rot problem and operate as a fully independent scientist.

When Kuo C. Lu joined the Division of Forest Pathology at Corvallis in November 1960 he brought with him not only an unusual background but a new spirit of exploration. After earning his B.S. degree from there in 1937, K. C. (pronounced Casey) taught at the University of Nanking until the war came along and he joined the Chinese Air Force. He advanced to become chief liaison officer with the U. S. Air Force and this provided him entry into the USA in 1947 after the war had ended. He came to Oregon State College and studied soil microbiology with a minor in plant pathology and biochemistry, receiving his Ph.D. degree in 1953. From 1957 to 1960 he taught soil microbiology at Cornell, financed by United Fruit Company to do research on banana wilt.

In March 1960, K. C. went into secret research in biological warfare at Ft. Detrick, Maryland, but he found this work contrary to his principles and ideals so it was relatively easy to lure him away.

When the Division of Forest Pathology assigned him to Corvallis, K. C. more or less provided his own office and laboratory space on the OSU campus through the courtesy of his old friend Dr. Bollen of the Bacteriology Department. For the next eight years, with the help of NFS grants available to Dr. Bollen, Dr. Lu was able to purchase the necessary equipment and support his student assistants while doing outstanding work on forest soil microbiology and biological control of root diseases. He is now provided somewhat better (but still crowded) facilities in the Forestry Sciences Laboratory where he is a valued member of Trappe's team working on western root diseases and soil microbiology.

No account of K. C.'s activities would be complete, however, without mentioning that he and his wife make their home in Corvallis a mecca for Chinese students all up and down the West Coast--their home away from home in a foreign land.

The Lu home is also a gathering place for other races as well, and K. C. makes no idle boast when he says he doesn't worry about his job because he could always open a Chinese restaurant, with his wife's help, of course!

Bratislav Zak was transferred from Athens, Georgia to Corvallis in July 1962 to serve as project leader for the mycorrhizal research. Zak had worked at the Athens, Georgia laboratory, except for time out for graduate studies at Duke, since November 1946, so was already an experienced research scientist with an established worldwide reputation as an authority in his field. He was the first to advance the hypothesis that besides improving the availability and absorption of nutrients, mycorrhizae serve also to protect delicate absorbing root tissue from soil pathogen attack (later confirmed by Dr. Marx at Athens). The work at Corvallis was later reallocated and in 1965 Dr. Trappe was made project leader, thus relieving Zak of administrative duties so he could devote full time to his valuable research on mycorrhizae and the taxonomy of related fungi. (It was a shock but a pleasant surprise to Zak's many friends when, finally in 1972, he got married.)

James M. Trappe joined the Division of Forest Pathology at the Corvallis laboratory in 1965 as leader of the Root Diseases and Soil Microbiology Project. Jim had worked for the Forest Service since 1954, however, including a tour of duty at the Inland Empire Research Center in Spokane in 1955, at La Grande, Oregon in 1956, and finally into Portland in 1958 on regeneration research. As Project Leader, he now gives full rein to his interests in mycorrhizal relationships and the significance of Poria weirii root rot. His mycorrhizal research had led him into increased interest in fungus taxonomy where his special concern with the Tuberales (truffles) has given him an international reputation in this group of fungi and an area of mutual interest and cooperation with the late Dr. Helen Gilkey of the Botany and Plant Pathology Department of Oregon State. This

special interest also prompted a year's trip abroad (1967-68) to study European Tuberales. During this time he was headquartered at the Botanical Institute of the University of Torino, Italy. In 1927 he spent three months collecting and studying truffles and related mycorrhizal fungi in central Mexico, working there with Professor Gaston Zuzman of the National Polytechnic Institute of Mexico.

Keith R. Shea joined the Division at Corvallis in July 1966, another scientist who came into the organization directly as a Project Leader. Keith had been pathologist with the Weyerhaeuser Company at Centralia, Washington for ten years before replacing Toby Childs as leader of the Diseases Reducing Timber Production project. Childs had never moved to Corvallis. Both he and R. L. Furniss, an entomologist, had been Division Chiefs, but in the 1964 reorganization Bob became the Assistant Director for Insect and Disease Research and Toby elected to become a Project Leader. Keith only stayed five years, though, then moved on to head up Forest Disease Research in the Washington Office of the Forest Service.

D. M. Knutsen was the next addition to the staff, coming to Corvallis in 1968 immediately upon completion of his doctoral degree and was assigned to work on dwarfmistletoes, first, under Keith Shea, but now Jim Stewart. He had worked on meteorological aspects of the epidemiology of wheat rust for his master's and on wetwood of aspen for his doctoral degree. But he had also had summer experience on the Gifford Pinchot National Forest and in Jackson Hole, and after getting his bachelor's degree had two years as a Junior Forester on the Boise National Forest. He had also found time to spend two years in the Army.

Ching Yan Li has become a valuable member of Trappe's Soil Microbiology project since joining the Corvallis staff in 1969 just about the time he received his permanent residence permit (4/28/69). Ching Yan had worked with Dr. Bollen at Oregon State, as had K. C. Lu during his graduate studies, so it is only natural that their three-way cooperation continues. His doctoral program, and

subsequent research, has dealt with enzymes, phenolics, fatty acids, and other compounds in alder and other plant tissues and in soil with special emphasis on inhibitory effects against tree root pathogens and other soil organisms.

James L. Stewart is the most recent man to have joined this illustrious line of forest pathologists who have served the Northwest for over 50 years now. Jim replaced Keith Shea as Project Leader at Corvallis but didn't come on the job until in May 1972. Jim had worked with Forest Service Pest Control on both insect and disease problems in the Rocky Mountain area from 1963 to June 1968, except for time out for schooling. After that he joined Ben Howard in Pest Control in Region 6 as section head of disease work with special interest in dwarfmistletoes. In February 1971 he was moved to Alexandria, Louisiana as Zone Supervisor in Forest Pest Control, but, as noted above, left fourteen months later for the Corvallis research assignment.

Jim is a Ph.D. candidate at the University of Michigan, having already met all but the dissertation requirement. He plans to tackle some dwarfmistletoe problems as both his official work commitment and as his dissertation subject.

The technical forest disease research staff of the Pacific Northwest Forest and Range Experiment Station are now all located at the Forestry Sciences Laboratory at Corvallis, Oregon in two projects: Western Root Diseases and Soil Microbiology, Dr. James M. Trappe, Project Leader, and staff of Dr. B. Zak, Dr. Kuo C. Lu, Dr. Earl E. Nelson, and Dr. Ching Yan Li; and Forest Diseases of the Pacific Northwest, James L. Stewart, Project Leader, and staff of Paul E. Aho, George M. Harvey, and Dr. Donald M. Knutson. All come under the administrative supervision of Kenneth H. Wright, a trained entomologist and Assistant Director for Forest Protection Research in Portland since January 1967.

Alaska is not a part of Region 6 but pathologists from PNW, and other places, have been giving at least token attention to its need for many years now.

Beginning in the early thirties, the late Dr. Dow V. Baxter, from the University of Michigan, usually accompanied by a student or two, has made almost annual summer collecting forays to our northland. Ernie Wright worked up there in 1943, with George Englerth, out of Portland, while Jim Kimmey was detailed there on cull studies from San Francisco for most of 1952, 1953, and 1954, though he did find time for a bit of fishing and an occasional evening in the Red Dog Saloon. Tom Laurent has worked for the Forest Service in Alaska since 1956 but not involved in pathology except since 1963 and then not as an employee of the Division of Forest Disease Research except for the one year 1961-62 when he worked out of the Portland office mainly as on-the-job training for his Alaskan cull studies. Variously employed by Forest Pest Management or Forest Survey, Tom has for years now been ambassador without portfolio keeping track of the tree disease situation in Alaska, the only such representative permanently there. In 1958, Dr. David W. French, Professor of Forest Pathology from the University of Minnesota, received a substantial Forest Service grant to conduct a comprehensive survey of the forest diseases of Alaska but as yet no report has been published. Donald Graham, Keith Shea, and Jim Stewart made hurried dwarfmistletoe surveys in recent years and in 1971 Douglas R. Miller from PSW assisted Tom Laurent on a survey of disease problems in young growth. That's forest pathology to date in Alaska.

APPENDIX

Boyce, John S. (See Region 5)

Students: (from the West while Professor of Forest Pathology at Yale)

P. E. Aho	J. P. Daniels	J. W. Kimmey
S. R. Andrews	G. H. Englerth	J. L. Mielke
J. L. Bedwell	L. S. Gill	R. B. Smith
T. S. Buchanan	J. R. Hansbrough	G. P. Thomas
D. C. Buckland	G. M. Harvey	E. H. Tryon
F. W. Cobb	F. G. Hawksworth	C. A. Wellner

Publications:

Boyce, John S.

1923. A study of decay in Douglas-fir in the Pacific Northwest.
U. S. Dept. Agr. Bull. 1163, 20 pp.

1923. Decays and discolorations in airplane woods. U. S.
Dept. Agr. Bull. 1128, 20 pp.

1927. Decay and seed trees in the Douglas-fir region. Jour.
For. 25: 835-839.

1929. Deterioration of windthrown timber on the Olympic Peninsula
in Washington. U. S. Dept. Agr. Tech. Bull. 104, 28 pp.

1932. Decay and other losses in Douglas-fir in western Oregon and
Washington. U. S. Dept. Agr. Tech. Bull. 286, 60 pp.

1938. Forest pathology. McGraw-Hill Book Co., New York and
London, 600 pp.

Lachmund, Harry G. (See Region 5)

Publications:

Lachmund, Harry G.^{1/}

1933. Method of determining age of blister rust infection on western white pine. Jour. Agr. Res. 46: 675-693.

1933. Resistance of the current season's shoots of Pinus monticola to infection by Cronartium ribicola. Phytopath. 23: 917-922.

1933. Mode of entrance and periods in the life cycle of Cronartium ribicola on Pinus monticola. Jour. Agr. Res. 47: 791-805.

1934. Growth and injurious effects of Cronartium ribicola conifers on Pinus monticola. Jour. Agr. Res. 48: 475-503.

1934. Seasonal development of ribes in relation to spread of Cronartium ribicola in the Pacific Northwest. Jour. Agr. Res. 49: 93-114.

1934. Damage to Pinus monticola by Cronartium ribicola at Garibaldi, British Columbia. Jour. Agr. Res. 49: 239-249.

Mielke, James L. (See also Region 5, Region 3, and INT)

BSF Oregon Agricultural College 1925
M.S. Oregon Agricultural College 1933

^{1/} It is interesting to note, like Dr. Meinecke under whom he trained, that he shared few authorships with those who worked for him.

Publications:

Mielke, James L.

1933. Comparison of pycnial stage of Cronartium ribicola on Pinus lambertiana and P. monticola. Phytopath. 23: 204-205.

1933. Tuberculina maxima in western North America. Phytopath. 23: 299-305.

1935. Rodents as a factor in reducing aecial sporulation of Cronartium ribicola. Jour. For. 33: 994-1003.

and J. W. Kimmey

1935. Dates of production of the different spore stages of Cronartium ribicola in the Pacific Northwest. Phytopath. 25: 1104-1108.

1937. An example of the ability of Ribes lacustre to intensify Cronartium ribicola on Pinus monticola. Jour. Agr. Res. 55: 873-882.

1943. White pine blister rust in western North America. Yale University, School of Forestry Bull. No. 52, 155 pp. (His Ph.D. dissertation).

Partington, C. N.

Although his assistance is acknowledged in some publications, he had no authorships.

Nusbaum, Charles J.

B.S.	(Bot. & Pl.Path.) Oregon Agricultural College	1929
M.S.	(Pl.Path.) University of Wisconsin	1931
Ph.D.	(Pl.Path.) University of Wisconsin	1934

Assistance acknowledged in some publications but no authorship.

KimmeY, James W. (See also Region 5 and INT)

B.S.	(For.) Oregon Agricultural College	1931
M.S.	(For.) Oregon Agricultural College	1932
Ph.D.	(For.) Yale University	1940

Publications:

KimmeY, James W.

1935. Susceptibility of principal ribes of southern Oregon to white pine blister rust. Jour. For. 33: 52-56.

1938. Susceptibility of ribes to Cronartium ribicola in the West. Jour. For. 36: 312-320.

1940. Time of growth of Cronartium ribicola cankers on Pinus monticola at Rhododendron, Oregon. Phytopath. 30: 80-85.

and R. L. Furniss

1943. Deterioration of fire-killed Douglas-fir. U. S. Dept. Agr. Tech. Bull. 851, 61 pp. (First USDA Tech. Bull. to be printed on glazed paper).

Buchanan, Thomas S. (See also Region 5, Private Industry, University of Idaho, and Washington Office)

B.S.	(For.) University of Idaho	1935
M.S.	(For.) University of California	1937

Publications:

Buchanan, Thomas S.

1938. Blister rust damage to merchantable western white pine. Jour. For. 36(3): 321-328.

1938. Annual growth rate of Cronartium ribicola cankers on branches of Pinus monticola in northern Idaho. Phytopath. 28(9): 634-641.

Buchanan, Thomas S. and J. W. Kimmey

1938. Initial tests of the distance of spread to and intensity of infection on Pinus monticola by Cronartium ribicola from Ribes lacustre and R. viscosissimum. Jour. Agr. Res. 56(1): 9-30.

and G. H. Englerth

1940. Decay and other losses in wind-thrown timber on the Olympic Peninsula, Washington. U. S. Dept. Agr. Tech. Bull. No. 733, 30 pp.

Childs, Thomas W.

- B.S. (For.) Oregon Agricultural College 1929
Ph.D. (Bot.) University of Pennsylvania 1936

Publications:

Childs, Thomas W., J. L. Bedwell, and G. H. Englerth

1938. Blister rust infection on Pinus albicaulis in the Northwest. U. S. Dept. Agr. Plant Dis. Rept. 22: 139-140.

and J. W. Kimmey

1938. Studies on probable damage by blister rust in some representative stands of young western white pine. Jour. Agr. Res. 57: 557-568.

1939. Decay of slash on clear-cut areas in the Douglas-fir region. Jour. For. 37: 955-959.

1963. Poria weirii root rot. Phytopath. 53: 1124-1127.

1968. Comandra rust damage to ponderosa pine in Oregon and Washington. U. S. For. Serv., Pac. NW For. & Range Exp. Sta., 8 pp.

1968. Elytroderma disease of ponderosa pine in the Pacific Northwest. USDA For. Serv. Res. Pap. PNW-69, 45 pp.

Childs, Thomas W.

1970. Laminated root rot of Douglas-fir in western Oregon and Washington. USDA For. Serv. Res. Pap. PNW-102, 27 pp.

Cummins, William F.

B.S. (For.) Oregon Agricultural College 1931

Assistance acknowledged in some publications but no authorship.

McCready, Alan A.

B.S. (For.) Oregon Agricultural College

M.S. (For.) Yale University

Assistance acknowledged in some publications but no authorship.

Hansbrough, John R. (See also Washington Office)

Ph.B. Brown University 1925

A.M. Brown University 1926

Ph.D. (For.Path.) Yale University 1936

Publications:

Lachmund, H. G. and J. R. Hansbrough

1932. Preliminary report on the relative susceptibility of sugar pine and western white pine to blister rust. Jour. For. 30: 687-691.

Mielke, J. L. and J. R. Hansbrough

1933. Susceptibility to blister rust of the two principal ribes associates of sugar pine. Jour. For. 31: 29-33.

Lachmund, H. G. and J. R. Hansbrough

1934. Survival of blister rust mycelium in western white pine. Jour. Agr. Res. 48: 1043-1047.

Pierson, Royale K.

B.S. (Pl.Sci.) University of Montana 1930
M.S. (For.) University of Idaho 1933

Publications:

Pierson, Royale K.

1933. Fusion of pycniospores with filamentous hyphae in the pycnium of white pine blister rust. *Nature* (London) 131: 728-729.

1936. A method of separating the teliospores of Cronartium ribicola. *Phytopath.* 26: 923-925.

and T. S. Buchanan

1938. Age of susceptibility of Ribes petiolare leaves to infection by aeciospores and urediospores of Cronartium ribicola. *Phytopath.* 28(10):709-715.

and

1938. Susceptibility of needles of different ages on Pinus monticola seedlings to Cronartium ribicola. *Phytopath.* 28(11): 833-839.

Bedwell, Jesse L.

B.S. (For.) University of Idaho 1920
M.S. Oregon Agricultural College 1924
Ph.D. (For.) Yale University 1932

Publications:

Bedwell, Jesse L.

1938. The present status of chestnut blight in the Pacific Northwest. U. S. Dept. Agr. Plant Dis. Rept. 22: 66-68.

and Thomas W. Childs

1943. Susceptibility of whitebark pine to blister rust in the Pacific Northwest. *Jour. For.* 41: 904-912.

Bedwell, Jesse L.

1948. Susceptibility of some white pine species to Cronartium ribicola in the Pacific Northwest. Jour. For. 46: 595-599.

Englerth, George H.

BSF	University of Washington	1933
M.F.	University of Michigan	1935
Ph.D.	Yale University	1940

Publications:

Englerth, George H.

1942. Decay of western hemlock in western Oregon and Washington. Yale University, School of For. Bull. 50, 53 pp.

and Leo A. Isaac

1944. Decay of western hemlock following logging injury. The Timberman 45(8): 34-36.

Tryon, Earl H.

B.S.	University of New Hampshire	1936
M.S.	Oregon State College	1940

Assistance acknowledged in some publications but no authorships.

Wright, Ernest (See also Region 5 and Oregon State University)

Ph.D. (Pl.Path.) University of Nebraska 1941

Publications:

Wright, Ernest

1945. Relation of macrofungi and microorganisms to damping-off of broadleaf seedlings. J. Agr. Res. 70: 133-141.

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Rhoads, Arthur S.

- B.S. Pennsylvania State University 1914
M.S. Pennsylvania State University 1915
Ph.D. (For.Path.) Syracuse University 1917

Publications:

Rhoads, Arthur S. and Ernest Wright

1946. Fomes annosus commonly a wound pathogen rather than a root parasite of western hemlock in western Oregon and Washington. Jour. For. 44(12): 1091. December.

Wright, Ernest, Arthur S. Rhoads, and Leo A. Isaac

1947. Decay losses following logging injury in partially cut stands of western hemlock and Sitka spruce. The Timberman 48: 3 pp.

Harvey, George M. (See also University of Idaho)

- B.A. Antioch University 1946
M.A. Yale University 1948

Publications:

Harvey, George M.

1962. Heart rots of Douglas-fir. USDA For. Serv., For. Pest Leaflet 73, 8 pp.

Wright, Ernest, George M. Harvey, and Charles A. Bigelow

1963. Tests to control Fusarium root rot of ponderosa pine in the Pacific Northwest. USDA For. Serv. Tree Planters' Notes 59: 15-20.

Wright, K. H. and George M. Harvey
1967. The deterioration of beetle-killed Douglas-fir in western Oregon and Washington. U. S. For. Serv. Res. Pap. PNW-50, Pac. NW For. and Range Exp. Sta.

Clark, J. W.

A.B. Baylor University 1942
MSF University of Washington 1949

Hunt, John

BSF University of Washington 1949
M.S. University of Washington 1951
Ph.D. (Bot.) New York State University
College of Forestry 1954

Publications:

Hunt, John

1956. Taxonomy of the genus Ceratocystis. Lloydia 19: 1-58.

1959. Phytophthora lateralis on Port-Orford cedar. USDA For. Serv., PNW For. Exp. Sta. Research Note 172: 1-6.

Aho, Paul E.

B.S. (For.) University of Massachusetts 1956
M.F. Yale University 1957

Publications:

Aho, Paul E.

1960. Heart-rot hazard is low in Abies amabilis reproduction injured by logging. USDA For. Serv., PNW For. & Range Exp. Sta. Note 196, 5 pp.

Aho, Paul E.

1966. Defect estimation for grand fir, Engelmann spruce, Douglas-fir, and western larch in the Blue Mountains of Oregon and Washington. USDA For. Serv., PNW For. and Range Exp. Sta. Misc. Paper, 26 pp., illus.

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1971. Decay of Engelmann spruce in the Blue Mountains of eastern Oregon and Washington. USDA For. Serv., PNW For. & Range Exp. Sta. Res. Pap., 32 pp.

Seidler, R. J., P. E. Aho, P. N. Raju, and H. J. Evans

1972. Nitrogen fixation by bacterial isolates from decay in living white fir trees (Abies concolor (Gord. and Glend.) Lindl.). Gen. Microbiology 73: 413-415.

Krueger, Kenneth W.

- B.S. (For.) University of Idaho 1957
Ph.D. Oregon State University

Publications:

Hunt, John M. and Krueger, Kenneth W.

1962. Decay associated with thinning wounds in young-growth western hemlock and Douglas-fir. Jour. For. 60: 336-340.

Nelson, Earl E.

- B.S. (For.) Oregon State University 1957
Ph.D. (Pl.Path.) Oregon State University 1962

Publications:

Nelson, Earl E.

1964. Some probable relationships of soil fungi and zone lines to survival of Poria weirii in buried wood blocks. Phytopath. 54: 120-121.

-
1970. Effects of nitrogen fertilizer on survival of Poria weirii and populations of soil fungi and aerobic actinomycetes. NW Sci. 44(2): 102-106.

Lu, Kuo C.

B.S. (Pl.Path.) University of Nanking 1937
Ph.D. (Soil Microbiol.) Oregon State University 1953

Publications:

Neal, J. L., Jr., K. C. Lu, J. M. Trappe, and W. B. Bollen
1966. Rhizosphere microbial activity of mycorrhizal and nonmycorrhizal roots of Douglas-fir and red alder. Bacteriol. Proc. A10.

Bollen, Walter B., Chi-Sen Chen, Kuo C. Lu, and Robert F. Tarrant
1967. Influences of red alder on fertility of a forest soil--microbiol and chemical effects. Ore. State Univ., For. Res. Lab. Bull. 12, 61 pp.

Tarrant, R. F., K. C. Lu, W. B. Bollen, and J. F. Franklin
1969. Nitrogen enrichment of two forest ecosystems by red alder. USDA For. Serv. Res. Pap. PNW-76, 8 pp.

Li, C. Y., K. C. Lu, J. M. Trappe, and W. B. Bollen
1972. Poria weirii-inhibiting and other phenolic compounds in roots of red alder and Douglas-fir. Microbios 5: 65-68.

Zak, Bratislav

BSF Pennsylvania State University 1941
M.F. Duke University 1949
D.F. Duke University 1954

Publications:

Zak, Bratislav
1964. Role of mycorrhizae in root disease. Annu. Rev. Phytopath. 2: 377-392.

1969. Characterization and classification of mycorrhizae of Douglas-fir. I. Pseudotsuga menziesii + Poria terrestris (blue- and orange-staining strains). Can. Jour. Bot. 47: 1833-1840.

Zak, Bratislav

1971. Characterization and classification of mycorrhizae of Douglas-fir. II. Pseudotsuga menziesii + Rhizopogon vinicolor. Can. Jour. Bot. 49: 1079-1084.

Trappe, James M.

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| B.S. | (For.) University of Washington | 1953 |
| M.S. | (For.) Syracuse University | 1956 |
| Ph.D. | University of Washington | 1962 |

Publications:

Trappe, James M.

1960. Some probable mycorrhizal associations in the Pacific Northwest. II. NW Sci. 34(4): 113-117.

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1963. Some probable mycorrhizal associations in the Pacific Northwest. IV. NW Sci. 37(1): 39-43.

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1964. Mycorrhizal hosts and distribution of Cenococcum grandiforme. Lloydia 27(2): 100-106.

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1965. Tuberculate mycorrhizae of Douglas-fir. For. Sci. 11(1): 28-32.

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1968. Pure culture of Douglas-fir mycorrhizae with species of Hebeloma, Suillus, Rhizopogon, and Astroeus. For. Sci. 13(2): 121-130.

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- J. F. Franklin, R. F. Tarrant, and G. M. Hansen (editors)
1968. Biology of alder. 292 pp. Proc. of a symposium held at NW Scientific Assoc. Fortieth Annual Meeting, Pullman, Washington, April 14-15, 1967. Published by PNW For. and Range Exp. Sta., For. Serv., USDA, Portland, Oregon.

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1969. Mycorrhiza forming Ascomycetes. In Proc. of the 1st North Amer. Conf. on Mycorrhizae. Misc. Publ. 1189, USDA, For. Serv., pp. 19-37.

Shea, Keith R. (See also Private Industry and Washington Office)

B.S. (For.) University of Minnesota 1950
Ph.D. (Pl.Path.) University of Wisconsin 1954

Publications:

Childs, T. W. and K. R. Shea

1967. Annual losses from disease in Pacific Northwest forests.
U. S. For. Serv. Resource Bull. PNW-20, 19 pp.

Knutsen, D. M.

B.S. (For.) University of Minnesota 1957
M.S. (Pl.Path.) University of Minnesota 1964
Ph.D. (For.) University of Minnesota 1968

Li, Ching Yan

B.S. National Taiwan University 1960
M.S. Oklahoma State University 1963
Ph.D. Oregon State University 1969

Publications:

Li, Ching Yan, K. C. Lu, J. M. Trappe, and W. B. Bollen

1969. Effect of phenolic and other compounds on growth of
Poria weirii in vitro. Micorios 3: 305-311.

_____, K. C. Lu, J. M. Trappe, and W. B. Bollen
1970. Inhibition of Poria weirii and Fomes annosus by linoleic
acid. For. Sci. 16(3): 329-330.

Stewart, James L.

B.S. (For.) Michigan State University 1960
M.S. (Pl.Path.) Michigan State University 1963

Laurent, Thomas H.

B.S. (For. Mgt.) University of Idaho 1949
M.S. (Path.) Montana State University 1963

OREGON STATE UNIVERSITY

Corvallis, Oregon

While "diseases of forest trees" was listed as a formal project in the botany department as early as 1916, actual work on forest disease research dates back less than 25 years at Oregon State, but there has been strong work in plant pathology since 1904. At that time forestry was a curriculum in the Department of Botany and Forestry and instruction in pathology was readily available to students in the forestry option. In 1912, after forestry had become a separate department, C. E. Owens joined the botany faculty straight from his graduate studies at Indiana and H. P. Barss moved in from a comparable position he had held at Washington State College. Both served eventually as head of the department, now the Department of Botany and Plant Pathology. Then in 1918, Helen M. Guilkey who had been with the department since 1904 returned from leave for graduate study and served as a plant taxonomist and mycologist. Although only Professor Owens actually taught the course in forest pathology (from the late 1920's to 1936), many students, especially foresters who went into forest disease research or related fields, came under the lasting influence of these fine teachers. Professor Owens, of course, found time also to author his enduring textbook on Principles of Plant Pathology in 1928. His strongest forestry leaning was an interest in the decay caused by Fomes pini which became the subject of his doctor's dissertation.

During these early days, two other pathologists appeared at OAC with a concern for forest disease. S. M. Zeller, who had trained at the Missouri Botanical Gardens under von Schrenk, came in the early 1920's as research professor in plant pathology with a primary responsibility for orchard disease. Zeller was primarily a physiologist and mycologist but he retained an interest

in forest fungi. In addition to his authoritative work on Gasteromycetes, he studied varietal relationships in Fomes cajanderi (F. subroseus) and F. pinicola. Perhaps best known in this area are his questioning of the relationship between Armillaria mellea on oaks and on Douglas-fir. Then about 1918 it must have been that L. N. Gooding, an employee of the Office of Blister Rust Control, BPI, USDA, joined the staff of the Agricultural Experiment Station as Junior Plant Pathologist and for a number of years directed the rust eradication program. In the late twenties he started a varietal garden along Still Creek near Rhododendron, Oregon at the foot of Mt. Hood in which to test the relative susceptibility of various species of native ribes to white pine blister rust. He had a strong interest in plant taxonomy and the biological control of plant diseases that led him to send to Germany for cultures of Tuberculina maxima which he turned loose in northern Idaho and southern British Columbia in the early thirties. He and Zeller appear to have often worked as a team in those earlier years; as such they made significant contributions to our knowledge of canker diseases.

When Don Rogers joined the faculty in 1936, he took over the course in Forest Pathology that Dr. Owens had been teaching. But there was still no active forest disease research. Even the forest pathology teaching was highly flavored with mycology, for Oregon State has always had a strong mycology/taxonomy group. At that time Dr. Gilkey was a world authority on the Tuberales, Dr. Rogers an expert on the Thelephoraecae, and Dr. Zeller an expert on the Gasteromycetes. The University still keeps a good viable fungus herbarium with a trained mycologist in charge, an herbarium rich in type specimens of the Uredinales and including a good collection of slime molds.

Dr. Lew Roth replaced Dr. Rogers in 1940 and assumed the teaching load in Forest Pathology. Two other significant changes were also made at this time;

formal training at the graduate level was offered for the first time, and this led, naturally, to a deeper faculty involvement in forest disease research.

Dr. Roth came to Oregon State straight from graduate work at Wisconsin, where he had been A. J. Riker's first graduate student in forest pathology; Dr. Owens urged that increased emphasis be given to forestry problems. But, easier said than done, Lew taught forest pathology to foresters for two years, but his other duties as assigned were too numerous to permit his getting started in research. Then he took time off to serve in the U. S. Navy during World War II. After five years of duty, he decided against a career on the high seas and after a year's refresher at Harvard, he returned to his duties at OSC in 1947. Only then did serious graduate training and research in forest pathology get started at Oregon State, and then not until Dr. Roth had survived a couple years of teaching forest pathology to hordes of returning G.I. undergraduates. (Dr. Roth himself had a strong mycological interest, Discomycetes, that he had succeeded in relegating to a position secondary to forest disease research.)

Dr. Roth became involved early in his research with the dwarfmistletoe problem, especially the dynamics of mistletoe populations. His other primary pursuits have been on Phytophthora lateralis which threatens survival of the unique and valuable Port Orford cedar; on the potential of Phytophthora cinnamomi as forest pathogen in the Pacific Northwest; and on Elytroderma deformans of ponderosa pine. On this latter problem, he and Dr. Waters at Montana State University almost simultaneously disclosed the systemic nature of the causal organisms. Dr. Roth's most active work today is a joint effort with the St. Regis Company to control a uniquely destructive outbreak of Armillaria mellea root rot in ponderosa pine.

Lew's biggest contribution to forest disease research has perhaps been his guidance and counseling of graduate students, many of whom have been and are

career Forest Service employees stationed on the campus at the Corvallis Forestry Sciences Laboratory. Their dissertation problems have invariably been designed to solve a significant problem, not just to get a degree. For example, when E. George Kuhlman was there from September 1957 to June 1961, he worked on the survival pathogenicity of Phytophthora cinnamomi in several western Oregon soils. As a graduate assistant, George also helped Dr. Roth with his teaching load and actually taught the course his last year there because Lew had taken a sabbatical leave because of health problems. Earl Nelson worked on certain aspects of Poria weirii. Paul Aho is currently working on the decays of white fir on the Rogue River National Forest and George Harvey with Lophodermella morbida on off-site ponderosa pine in western Oregon. Enabled by a U. S. Forest Service grant in aid, Everett Hansen joined the botany/forestry faculty in 1972 as a Post Doctorate from the University of Wisconsin to strengthen the program and to initiate research on Poria root rot of Douglas-fir.

In addition to the work done in the Department of Botany and Plant Pathology, some forest disease research has been conducted from time to time at the Oregon Forest Products Laboratory (originally a separate institution financed by the state's timber severance tax, but now a unit of the School of Forestry). One of the first of these was a conk rot study organized in the spring of 1948 when Phimister B. Proctor was Managing Director of the Laboratory and completed in 1951 by the Research Division of the Oregon State Forestry Department. This distinctly cooperative effort resulted in the publication, "Conk Rot of Old-Growth Douglas-fir in Western Oregon," authored by J. S. Boyce and J. W. Bruce Wagg. The following men, all of Oregon State College, also worked in the project for two or more field seasons and contributed technical direction:

William A. Davies, Professor of Forest Engineering
John B. Grantham, Professor of Forest Products
Lewis F. Roth, Associate Professor of Botany

In 1957, Ernest Wright, who had just retired from his position with the Forest Service in Portland, Oregon, was employed by the Timber Management section of the Laboratory. Working there on mycorrhizal and replanting problems on burned-over area until he retired in 1965 to live in a pleasant retirement village in Woodburn, Oregon.

On January 30, 1962, Ernie miraculously survived an accident that nearly cost him both legs when caught between the bumpers of two cars in a chain rear-end collision one night along fog-shrouded Interstate 5 near Albany, Oregon. Happily, though it hastened his second retirement, his recovery was eventually complete, at least to the extent that he still plays a respectable game of golf for a man moving well along into his seventies.

Then in 1969, Ted Scheffer, who had also just retired from his position with the Forest Service at the Forest Products Laboratory in Madison, came to work at the Laboratory. There he joined Dr. M. E. Condon (Botany and Plant Pathology) and Dr. R. D. Graham in their work exclusively on fumigant protection of poles and other large wooden objects against decay, termites, ants, and such. Ted's special concern is with Douglas-fir poles.

APPENDIX

Lake, E. R. (1888-1912) Department of Botany and Forestry
 Jackson, H. J. (1912-1916) Department of Botany and Plant Pathology

Barss, H. P.

A.B. Rochester University 1907
 S.M. Harvard University 1909

Owens, C. E.

A.B. University of Indiana 1910
 A.M. University of Indiana 1911
 Ph.D. University of Wisconsin 1934

Gilkey, Helen M.

B.S. Oregon Agricultural College 1907
 M.S. Oregon Agricultural College 1911
 Ph.D. (Bot.) University of California 1915

Possible students of one or more of the above:

Ernest Wright	Douglas R. Miller
W. V. Benedict	C. P. Wessela
J. L. Mielke	Roy Blomstrom
T. W. Childs	Homer Hartman
C. J. Nusbaum	W. F. Cummins
J. W. Kimmey	A. A. McCready

Gooding, L. N.

B.A. University of Wyoming 1903
 B.S. University of Nebraska 1904

Zeller, S. M.

B.S.	Greenville College (dendropath.)	1909
A.B.	University of Washington	1912
A.M.	University of Washington	1913
Ph.D.	Washington University (St. Louis)	1917
Special Investigator, dendropathology,	Missouri Botanical Gardens	1917-1919

Publications:

Zeller, S. M.

1926. The brown pocket heart rot of stone fruit trees, caused by Trametes subrosea Weir. Jour. Agr. Res. 33: 687-693.

and L. N. Gooding

1930. Some species of Atropellis and Scleroderis in the Pacific Northwest. Phytopath. 20: 555-567, illus.

Rogers, Donald P.

B.A.	Oberlin College	1929
Ph.D.	(Mycol.) University of Iowa	1935

Roth, Lewis F.

B.S.	(Bot.) Miami University of Ohio	1936
Ph.D.	(Pl.Path.) University of Wisconsin	1940

Students:

J. R. Parmeter	Everett Hansen
E. George Kuhlman	Paul E. Aho
Earl E. Nelson	George M. Harvey
Peter P. Laird	Larry D. McDowell
Mary Ann Strand	Charles G. Shaw III

Others in training and employed in other branches of pathology and mycology.

Publications:

Roth, Lewis F.

1959. Perennial infection of ponderosa pine by Elytroderma deformans. Forest Sci. 5: 182-191.

1963. Phytophthora cinnamomi root rot of Douglas-fir. Phytopath. 53: 1128-1131.

and E. George Kuhlman

1963. Field tests of the capacity of Phytophthora root rot to damage Douglas-fir. J. Forest 61: 199-205.

Hansen, Everett

B.S. Oregon State University 1968

Ph.D. University of Wisconsin 1972

Wright, Ernest (See Pacific Northwest)

Publications:

Wright, Ernest

1971. Mycorrhizae on Douglas-fir and ponderosa pine seedlings.
For. Prod. Lab., School of Forestry, OSU, Res. Bull.
No. 13, 36 pp., June.

Scheffer, T. C.

B. S. University of Washington 1926

M.S. University of Washington 1929

Ph.D. (For.Path.) University of Wisconsin 1934

UNIVERSITY OF WASHINGTON

The University of Washington offers course work and conducts research in the field of Forest Pathology. The author regrets, however, that no documentation of current programs or past history was available for this compilation. It is known that Dr. Stuntz has worked there for many years in the area of Forest Mycology. Within recent years, Dr. Charles H. Driver came from Bainbridge, Georgia, where he was employed as Director of Forest Research for the International Paper Co., to give added impetus and strength to the University's program.

PRIVATE INDUSTRY

Private Industry in the West was early to recognize the importance of diseases and decays in their holdings of old-growth timber. As far back as 1899 several manufacturers jointly contributed \$550 to help defray the expense incurred by the U. S. Division of Forestry in keeping a party in the field during a 6-month period in 1899-1900 when they examined nearly all of the redwood belt. It appears that this contribution was used primarily to support the work of Dr. Hermann von Schrenk, Instructor in the Henry Shaw School of Botany, Washington University (St. Louis) in his study of the heart rots of redwood as part of this survey.

It was 1947, however, before a private timber company added a forest pathologist to the staff on a permanent, full-time basis. Early in that year, Dr. Thomas S. Buchanan, who had just been released from active duty with the U. S. Marine Corps in the Pacific, was hired by the Weyerhaeuser Timber Company and headquartered in their Development Department at Longview, Washington.

Weyerhaeuser had purchased a large tract of 180-year-old Douglas-fir on a "buyers" cruise. In planning a new integrated processing plant at Springfield, Oregon, it became essential more precisely to determine the cull factors in this timber in order properly to plan cutting cycles, cutting budgets, logging plans, plant capacity, etc. This was the problem seen by C. Davis Weyerhaeuser who was personally responsible for Dr. Buchanan's employment.

Sample acres were selected throughout the stand and all trees felled and dissected as far as necessary accurately to diagram the extent of decay. Computations made later in the office from these diagrams gave the cull picture.

Field crews were provided from other company operations except for the camp cook and the felling crew. This was right after World War II, and the powersaw

or chainsaw was just coming into its own. Chainsaw owners and operators were striking it rich, felling and bucking "by the bushel." Hence, it was possible to hire on a daily wage only a pair of novices who wished but to gain enough experience at someone else's expense to go out busheling on their own. Fortunately, the job was completed with no serious personal injuries.

The felling crew were each paid more than the "pathologist-in-charge" and they had none of the associated problems of running a camp, especially that of keeping a cook on the job. From the days of Paul Bunyan, camp cooks have been notorious drunks. This was no exception. One short termmer would get drunk at every opportunity and invariably pass out. When he came to, he'd inquire not as to what time it was, but as to what day it was.

No publications resulted from this work since it was basically confidential company business. In the summers of 1948, 1949, and 1950, however, the Oregon State Forest Products Laboratory and cooperators conducted a similar, but more refined and more extensive study. At least parts of Buchanan's basic data were made available to them by Weyerhaeuser Timber Company for inclusion in their 1953 report.

Buchanan was able to spend enough time on other Company holdings to note for the first time in either Oregon or Washington that Poria weirii root rot could survive long enough in the stumps of cutover infected Douglas-fir stands to invade the natural reproduction springing up around them. He also observed that old-growth Douglas-firs with heavy root and butt infection by this same fungus were especially attractive to the Douglas-fir bark beetle, Dendroctonus pseudotsugae.

Buchanan left the Weyerhaeuser Timber Company in August 1947 to teach Forest Pathology at the University of Idaho. It was nearly ten years before industry hired another forest pathologist as such on a full-time basis.

It was the Weyerhaeuser Company once again who in 1956 hired, from the faculty of the University of Wisconsin, Dr. Keith R. Shea as a forest pathologist and stationed him at their new Forestry Research Center in Centralia, Washington. Keith worked across the board on disease problems and, in many cases, in direct cooperation with members of the Division of Forest Disease Research from the Pacific Northwest Forest and Range Experiment Station and with the Forest Pest Control branch of Region 6, Portland, Oregon.

Among Keith's areas of research were studies of dwarfmistletoe damage to ponderosa pine, Poria weirii root rot, deterioration of firs killed by balsam wooly aphid, and on cone and seed storage problems. Another major line was a study of decays and deterioration of timber following catastrophic events, such as the Columbus Day 1962 blow down and following logging injury in partially cut stands of Douglas-fir and western hemlock. He also extended Buchanan's earlier heart rot studies on the Millicoma tract in southwestern Oregon to remnants of older stands intermingled with the generally 180-year-old majority.

Dr. Shea left his position as Forest Pathologist with the Weyerhaeuser Company in July 1966 to accept a position with the Forest Service as a disease research Project Leader at the Corvallis Research Center. Except for the 1970-1971 academic year when Dr. Wayne Sinclair, Professor of Forest Pathology at Cornell, spent his sabbatical leave with Weyerhaeuser in Centralia working on forest tree nursery and mycorrhizal problems, there have been no industrial forest pathologists on the West Coast since 1966.

Further east in the Inland Northwest, Dr. Otis C. Maloy had also been employed as a forest pathologist by Potlatch Forests, Inc., Lewiston, Idaho from September 1959 to July 1963. His basic assignment was to develop information that could be applied to forest management, especially with regard to decay of trees of the white pine type. In implementing this work he made an intensive

study of the decays, especially that caused by Echinodontium tinctorium in grand fir which occurs extensively in their timber holdings in the Inland Empire.

Although private industry employs no forest pathologists, as such, at this time, it still takes a strong interest in disease problems and disease research. Industrial representatives are most active in the various Forest Pest Action Councils in the West which play an increasingly important role in pressing for increased research on tree diseases and in pressing for funds for its support at both the State and Federal level.

APPENDIX

von Schrenk, Hermann

B.S. Cornell University 1893
A.M. Harvard University 1894
Ph.D. Washington University (St. Louis) 1897

Publications:

von Schrenk, Hermann

1899. A disease of Taxodium distichum known as peckiness, also a similar disease of Libocedrus decurrens known as pin-rot. Sci. Pap., Rep. of the Missouri Bot. Gard. Vol. II: 55 pp., 6 plates (some in color!). June 3, (his Ph.D. thesis).

1903. II. The brown rot disease of the redwood. In THE REDWOOD. USDA Bur. of Forest., Bull. No. 38, 29-31, illus.

Buchanan, Thomas S.

B.S. (For.) University of Idaho 1935
M.S. (For.) University of California 1937
Ph.D. Yale University 1943

Shea, Keith R.

B.S. (For.) University of Minnesota 1950
Ph.D. (Pl.Path.) University of Wisconsin 1954

Publications:

Shea, Keith R.

1959. Phytotoxicity of thiram to Douglas-fir seed. Weyerhaeuser Co., Forest Res. Note No. 21, 5 pp.

1960. Mold fungi on forest tree seed. Weyerhaeuser Co., Forest Res. Note No. 31, 10 pp.

Shea, Keith R.

1962. The endophytic system of ponderosa pine dwarfmistletoe in relation to swollen branch tissue. Forest Sci. 8(3): 298-302.

_____, Norman E. Johnson, and Samuel McKee

1962. Deterioration of Pacific silver fir killed by the balsam wooly aphid. J. Forest. 60(2): 104-108.

1963. Marking guide evolved for mistletoe-hit Douglas-fir. Forest Ind. 90(1): 58-59.

_____, and Thomas J. Orr

1963. A survey of dwarfmistletoe of ponderosa pine in south-central Oregon. J. Forest. 61 (2): 138-141.

1964. Silvicultural control of ponderosa pine dwarfmistletoe in south-central Oregon--a five year study. J. Forest. 62: 871-875.

Maloy, Otis C., Jr.

B.S.	(Pl.Path.)	University of Idaho	1951
M.S.	(Pl.Path.)	University of Idaho	1955
Ph.D.	(Pl.Path.)	Cornell University	1958

Publications:

Maloy, Otis C., Jr.

1961. Advance of rot caused by Fomes pini in mature western white pine. Northwest Sci. 35: 83-90.

1963. Sporulation and sporophore survival of Echinodontium tinctorium. Plant Dis. Rpt. 47: 627-631.

_____, and H. L. Gross

1963. Decay in young grand fir. J. Forest. 61: 850-853.

Forest Pathology Section^{1/}
PACIFIC FOREST RESEARCH CENTRE
Victoria, B. C.

formerly
Dominion Laboratory of Forest Pathology

Forest disease research in British Columbia is a service of the Dominion Government and there is no forest pathology research by the Provincial Government except that being conducted at the University. Like its neighbor to the South, forest disease research in Canada received its initial impetus from two major diseases: chestnut blight and white pine blister rust.

The history of forest pathology in British Columbia may be considered in two periods, 1918-1939, and 1940 to present, the year 1940 marking the date of establishment of the first permanent forest pathology laboratory in the Province. This event is considered noteworthy as it provided the first opportunity to give continuing on-site attention to forest diseases and to plan an orderly program of investigation directed to their solution. No record of forest pathology would be complete, however, without reference to the valuable contributions arising during the earlier period.

1918-1939

Major attention was first directed to problems of forest diseases on the west coast during the period of initial discovery of the blister rust disease of western white pine in western North America. Although preliminary scouting for

^{1/} With but very minor changes, the text of this section is essentially a reproduction of a report prepared by Dr. R. E. Foster in 1970. He was Officer-in-Charge of the Forest Pathology Laboratory in Victoria from 1949 until 1965 when he was appointed Director of the Forest Products Laboratory, Vancouver. The appendix material was provided largely through the courtesy of Dr. G. W. Wallis, now head of the Forest Pathology Section of the Pacific Forest Research Centre.

the disease had been carried out in 1918 by J. W. Eastham, Provincial Plant Pathologist, it remained for the first authentic record of its occurrence to be made in 1921 and to provide the necessary stimulus for widespread and major concern. Quarantines were established to prohibit the movement of pine and ribes between coast and interior regions of the Province, and in 1922 A. T. Davidson of the Division of Botany, Canada Department of Agriculture, Ottawa, was called on to supervise an extensive survey in cooperation with Provincial authorities. According to the Vancouver Daily Province of June 23, 1922, the rust was discovered in Washington and British Columbia last year (1921) and "that Dr. Bethel of Colorado State Museum at Denver is stationed at Abbotsford working with Mr. Studhalter and Dr. Pennington along the Fraser Valley from Chilliwack to the coast. The American experts judge that as the black currant is the only 'ribes' to encourage the fungus here,...and as the currant is of far greater importance to the coast than the pine, they will make no restrictions on it beyond quarantining the area and prevent exportation of the plants (not fruit)."

Blister rust brought a number of United States pathologists to the region: S. B. Detwiler, J. S. Boyce, H. G. Lachmund, J. L. Mielke, L. H. Pennington, J. W. Kimmey, T. S. Buchanan, T. W. Childs, and J. R. Hansbrough were among those to study the disease in western Canada during the early years. With the approval and cooperation of Mr. A. W. McCallum, the first Canadian forest pathologist (working under Dr. H. T. Gussow, then Dominion Botanist and Chief of the Division of Botany), pathologists from the United States conducted almost all of their research on white pine blister rust in British Columbia from the late twenties to the mid-thirties. Working out of the Portland, Oregon headquarters of the office of forest pathology, sizeable crews would leave for British Columbia in the spring and remain there essentially until driven out of the woods and back

to Portland by the fall snows. They covered both coastal and interior areas depending upon the specific problem under study. After the rust became firmly established south of the border, this effective and friendly international co-operation was gradually phased out. Cooperation in other problem areas of mutual concern, however, still continues on an equally effective and friendly basis.

During 1927 and 1928, Frank Dickson of the Department of Botany, University of British Columbia, conducted a study of the decays of alpine fir in the Upper Fraser region on behalf of the Provincial Forest Service. Preliminary investigations in Douglas-fir were also undertaken on Vancouver Island. The work on true fir constituted the first detailed pathological analysis in overmature timber in the Province. The study, undertaken at a time when pathological surveys were in an embryonic stage of development, provided an evident stimulus in the field of forest pathological research in British Columbia. One of Dickson's students, R. J. N. Mayers, worked on Echinodontium tinctorium in his graduate program and in 1932 provided one of the first studies on the biology of a forest fungus in British Columbia, being superceded only by Irene Mounce's 1929 treatise on Fomes pinicola. In later years Dickson stimulated others to an equally active interest in and appreciation of forest pathology.

In 1929, A. W. McCallum of the Division of Botany, Canada Department of Agriculture, Ottawa, was engaged in a cooperative study with the National Research Council relative to the effect of sulphur dioxide fumes on forest growth in the vicinity of Trail, B. C. Studies were carried out from 1929 to 1936. This work provided a comprehensive analysis of smelter fume injury and stands as a model for future investigations of this nature. During part of this period, McCallum worked in close cooperation with G. G. Hedgcock of the Washington, D. C. Office of Forest Pathology assisted by T. C. Scheffer from the Forest Products Laboratory, Madison, Wisconsin.

For varying periods between 1937 and 1939, Malcolm Wilson (England) and T. R. Peace (England); H. W. Wollenweber (Germany) and E. P. Meinecke (United States) were engaged in specific research projects on forest disease fungi that required observation or consultation in British Columbia. In most cases comprehensive reports were prepared on certain aspects of the forest disease situation. These provided valuable information assisting in the formulation of research programs in later years.

No report on early investigations in the province would be complete without reference to the basic work in forest mycology undertaken initially by Irene Mounce from 1924 to 1939 and later by M. K. Nobles, R. Macrae, I. L. Connors, H. S. Jackson, L. O. Overholts, and others. These studies provided criteria for identification and the basis for a broader understanding of the biology of the forest fungi. During this period extensive check lists were provided for the more important species on Vancouver Island and the adjacent mainland.

J. E. Bier of the Division of Botany and Plant Pathology, Canada Department of Agriculture, Ottawa, appeared on the scene in the summers of 1938 and 1939, following a request from the Provincial Forest Service for information on root rot in Douglas-fir. These studies aroused wide interest and were largely responsible for a later request for the establishment of a permanent laboratory.

In brief, these were the major events contributing to the early development of forest pathology in British Columbia. Other attention was being given to forest products pathology. Thus in 1923 H. W. Eades was appointed to the Vancouver Forest Products Laboratory of the then Department of the Interior. Early attention was directed to the natural discolorations, fungal stains, and decay of wood in service. A major treatise on the decays and natural defects occurring in softwoods provided the first authentic information in this field in British, Columbia.

1940-1970

J. E. Bier, the sole inhabitant of the newly-established "Dominion Laboratory of Forest Pathology" in Victoria from 1940 to 1942, soon found himself besieged with requests for work on a number of important problems. Thus, apart from need for continued research on Poria weirii, the British Columbia Forest Service called for research on damping-off of Douglas-fir in coastal nurseries, and the British Ministry of Supply having offices in Vancouver at that time, requested information on decay in aircraft spruce on the Queen Charlotte Islands and in western red cedar in coast and interior regions of the Province. D. C. Buckland and R. E. Foster were added to the staff in 1942 and 1943 respectively, Buckland initially to work on cedar and Foster to work on spruce. As the Provincial Forest Service and the forest industry continued to bring new and important problems forward between 1944 and 1947, three additional professionals were added to the staff, P. J. Salisbury, R. A. Waldie, and G. P. Thomas, Salisbury to concern himself with nursery diseases and Waldie and Thomas with forest decay.

In 1947 J. E. Bier was transferred to Ontario to establish a regional forest pathology laboratory and in the following year D. C. Buckland resigned to accept appointment as Professor of Forest Pathology at the University of British Columbia. R. E. Foster was appointed to succeed J. E. Bier as Officer-in-Charge of the British Columbia Laboratory in 1948. Four additional professionals were added in that year, W. G. Ziller to serve as regional mycologist with special reference to research on the forest tree rusts, J. E. Browne to study forest decay with initial reference to hemlock and Abies in the Kitmat region, A. K. Parker to study Rhabdocline needle casts of Douglas-fir and pole blight of pine, and W. A. Porter to examine the profile of blister rust resistant western white pine. By the end of the first decade the professional staff

stood at eight and the supporting staff at eleven. Of the latter, technicians A. T. Foster and H. M. Craig deserve special mention, not only because of their early vintage (1946) and the fact that they are still (in 1970) at the Laboratory, but also because they gradually took on assignments that in earlier days had occupied the attention of professional staff.

The next decade, 1950-1959, brought about further changes in personnel, P. J. Salisbury left in 1958 to concern himself with shelterbelt problems out of the then Indian Head Station of C.D.A., Phil Thomas left in 1958 to become Officer-in-Charge of the Alberta regional Forest Pathology Laboratory in Calgary, J. E. Browne left in 1953 to assume responsibility for studies in forest decay within the Surveys and Inventory Division of the B. C. Forest Service, and R. A. Waldie left in 1950 to accept an initial appointment leading to that of District Silviculturist, B. C. Forest Service, Nelson District.

Recruitment and internal reassignments during the second decade reflected a shift from the previous emphasis on decay to problems of the new forest. The shift away from forest decay was made possible by the development of a tree decadence classification system and the subsequent adoption of this system of extensive forest decay sampling by the Provincial Forest Service. This system is now in general use throughout the Province. The shift in emphasis towards second growth forests paralleled a general awakening of their potential contribution to the economy and of the need to gain more reliable information on factors depreciating their growth and development. This awakening was stimulated by the second public inquiry into forestry in British Columbia, 1955-1956, and by the discovery in commercial nurseries of *Phytophthora* root rot and other diseases of potentially serious consequence.

Six additional professionals were added to the roster during the decade, partly to fill gaps created by those who left and partly to open new areas of

investigation. J. R. Tannhauser was added in 1950 and N. T. Engelhardt in 1951 to give attention to forest decay, G. W. Wallis was appointed in 1951 to be responsible for studies of Poria root rot, A. C. Molnar was added in 1951 to take over a newly developed forest disease survey and to explore conditions in exotic forest tree plantations, R. G. McMinn was added in 1953 to bring an ecological viewpoint to forest disease investigations and to develop a better understanding of normal growth and development patterns in trees, W. J. Bloomberg was added in 1958 to study certain problems in Populus and in seedling losses in forest nurseries, A. Funk was added in 1958 to initiate a long range study of cankers and diebacks, and R. B. Smith was added in 1959 to supervise studies in forest decay and to undertake research on the dwarf mistletoes. Losses included J. R. Tannhauser by resignation in 1951 and N. T. Engelhardt by death in 1958. The end of the decade saw 10 professionals and 11 support staff, an increase of two professionals from the start of the period.

It is of more than passing interest to note that the first meeting of the Western International Forest Disease Work Conference was held in Victoria in 1953 under the sponsorship of the British Columbia Laboratory. This group of pathologists representing the two western provinces of Canada and eight of the western United States has continued to meet annually at different centers in western North America and has done much to foster an awareness of problems of mutual interest as well as a spirit of international cooperation. The stated purpose of the W.I.F.D.W.C. when first formed was, and still is, to serve "as a forum for exchange of information to lead us to a better understanding of major problems of mutual concern."

Further staff changes took place during the decade 1960-1969: leaving the Laboratory were W. A. Porter in 1960 to enter the teaching profession and R. E. Foster in 1965 to become Director, Forest Products Laboratory, Vancouver. G. W. Wallis was appointed to succeed Foster as head of the then Forest Pathology

Section of the Forest Research Laboratory. Added to the staff during the period were L. C. Weir in 1960 to explore the control of forest disease, D. J. Morrison in 1966 to study root rot, and D. E. Etheridge and J. B. Sutherland in 1967 to study the decay infection process and problems in forest nurseries, respectively.

The decade brought formal recognition in 1961 to a change that had otherwise been taking place slowly and inevitably over the years; namely, the amalgamation of the forest insect and disease surveys. A. C. Molnar and W. G. Ziller were involved in this development, transferring from the Pathology to the Survey Section. Later changes included the reassignment in 1969 of A. K. Parker and R. G. McMinn to operate as tree physiologist and ecologist, respectively, in a reconstituted Tree Biology Section of the Laboratory.

The decade brought a return to basic research in biological control under the aegis of J. E. Bier who had come west again in 1956 to the University of British Columbia. Particular emphasis was placed on interrelationships between elements of the naturally occurring microflora influencing a plant's susceptibility to disease. It may be regarded as a measure of the stimulation which Jack instilled in others that his untimely death in January 1967, at the height of his professional career, saw others carrying forward research in the areas in which he had stimulated international interest.

No basic changes were effected in the general program of the Forest Pathology Section (Forest Research Laboratory) in that primary attention continued to be directed to problems of the new forest. Attention was focused in some cases, however, on somewhat different problems that had previously been considered within this spectrum. Thus, early in the decade intensive studies of sampling in forest plantations were carried forward and initial studies were made of the potential of Fomes root rot in second growth forests. Studies were continued on dwarf mistletoe, on needle casts, cankers and diebacks, and on losses in

forest nurseries. Continuing emphasis was placed on Douglas-fir root rot and on intensive studies of the normal rooting characteristics of this species.

G. P. Thomas returned to British Columbia in 1969 to become Director, Forest Research Laboratory, Victoria.

A. J. Cserjesi and R. S. Smith joined the staff of the Forest Products Laboratory in Vancouver in 1960 and 1964 respectively, bringing to this activity a capacity for intensive background study and research on the biology of the fungi associated with wood stain and decay. H. W. Eades retired as head of this section in 1960 and J. W. Roff assumed command.

1970 - 19--

The first years of the present decade have already brought significant staff changes, L. C. Weir leaving to join the Oregon State Board of Forestry, J. C. Hopkins arriving to explore, initially, the status of white pine and its resistance to blister rust, J. Baranyay arriving to join the forest disease survey, and Phil Thomas leaving again to become Director General of the Canadian Forestry Service, Ottawa.

Postscript

This review has placed emphasis on those who have participated directly in the study of forest diseases in British Columbia. Many others have played a supporting role in this history but it would be unrealistic to attempt to identify all of them. Special reference should be made, however, to the British Columbia Forest Service which has shown continuing interest and has participated in cooperative studies over the years. This interest has been expressed at all administrative and management echelons and has done much to promote a climate for practical usage of research results.

APPENDIX

Bier, John Ertel

B.S.F.	University of Toronto	1932
M.A.	University of Toronto	1936
Ph.D.	University of Toronto	1938

Publications:

Bier, J. E.

1946. The relation of research in forest pathology to the utilization of overmature timber. The significance of brown pocket rot in Sitka spruce on the Queen Charlotte Islands. Brit. Columbia Lumberman 30(6): 54-55, 74.

and Mildred K. Nobles

1946. Brown pocket rot of Sitka spruce. Can. J. Research (C. Botan. Sci.) 24: 115-120.

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1946. Studies in forest pathology. IV. Decay of Sitka spruce on the Queen Charlotte Islands. Can. Dept. Agr. Pub. 783, Tech. Bull. 56, 35 pp.

, P. J. Salisbury, and R. A. Waldie

1948. Studies in forest pathology. V. Decay in fir, Abies lasiocarpa and Abies amabilis in the Upper Fraser Region of British Columbia. Can. Dept. Agr. Tech. Bull. 66, 28 pp.

Buckland, Donald C.

B.A.	University of British Columbia	1941
B.Sc.F.	University of British Columbia	1942
M.F.	Yale University	1943
Ph.D.	(For. Path.) Yale University	1945

Publications:

Buckland, Donald C.

1946. Investigations of decay in western red cedar. Can. J. Res. (C.) 24: 158-181.

Buckland, Donald C., R. E. Foster, and V. J. Nordin

1949. Studies in forest pathology. VII. Decay in western hemlock and fir in the Franklin River area, British Columbia. Can. J. Res. (C.) 27: 312-331.

_____, A. C. Molnar, and G. W. Wallis

1954. Yellow laminated root rot of Douglas-fir. Can. J. Bot. 32: 69-81.

Foster, Raymond Edwin

B.A. (Bot.&For.)	University of British Columbia	1942
B.S.F.	University of British Columbia	1943
Ph.D.	University of Toronto	1949

Publications:

Bier, J. E. and R. E. Foster

1946. The relation of research in forest pathology to the utilization of over-mature timber. II. Significance of conk rot in Sitka spruce on the Queen Charlotte Islands. B. C. Lumberman 30(5): 51-52, 65.

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1953. A tree decadence classification for mature coniferous stands. For. Chron. 29(4): 359-366.

_____, H. M. Craig, and G. W. Wallis

1954. Decay of western hemlock in the upper Columbia region of British Columbia. Studies in forest pathology. XII. Can. J. Bot. 32: 145-171.

_____, J. E. Browne, and A. T. Foster

1958. Decay of western hemlock and amabilis fir in the Kitimat region of British Columbia. Studies in forest pathology. XIX. Canada Department of Agriculture, Ottawa.

Foster, R. E. and A. L. S. Johnson

1963. Studies in forest pathology. XXV. Assessments of pattern, frequency distribution, and sampling of forest disease in Douglas-fir plantations. Can. Dept. of Forestry, Ottawa.

Salisbury, Phillip J.

B.S.A. University of British Columbia 1939

Publications:

Salisbury, P. J.

1954. A review of damping-off of Douglas-fir seedlings in British Columbia. For. Chron. 30: 407-410.

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1955. Parasitism of Phytophthora spp. isolated from roots of Port Orford cedar in British Columbia. Can. Dept. Agr., For. Biol. Div., Bi-mon. Prog. Rept. 11(5).

and J. E. Bosher

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1959. Nematode assays of some forest and nursery soils in British Columbia. Can. Dept. Agr., For. Biol. Div., Bi-mon. Prog. Rept. 15(2): 4.

Thomas, G. P.

B.A.	University of British Columbia	1947 Honours
B.S.C.	University of British Columbia	1948
M.F.	Yale University	1949 Cum laude
Ph.D.	University of British Columbia	1956

Publications:

Thomas, G. P.

1950. Two new outbreaks of Phomopsis lokoyae in British Columbia. Can. J. Res. (C) 28: 477-481.

and D. G. Podmore

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1953. Studies in forest pathology. XI. Decay in black cottonwood in the middle Fraser Region, British Columbia. Can. J. Bot. 31: 675-692.

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1954. Studies in forest pathology. XIV. Decay of Douglas-fir in the coastal region of British Columbia. Can. J. Bot. 32: 630-653.

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1958. Studies in forest pathology. XVIII. The occurrence of the Indian paint fungus, Echinodontium tinctorium E. & E. In British Columbia Can. Dept. Agr. Publ. 1041, 30 pp.

Parker, Arthur K.

- B.A. University of Saskatchewan 1948
M.A. University of British Columbia 1951
Ph.D. University of British Columbia 1956

Publications:

Parker, A. K.

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and A. L. S. Johnson

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1969. The genus Rhabdocline Syd. Can. J. Bot. 47: 1533-1545.

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Ziller, Wolf G.

B.Sc.F.	University of British Columbia	1949
M.A.	University of Toronto	1953
Ph.D.	(Mycol.) University of Toronto	1955

Publications:

Ziller, W. G.

1954. Studies of western tree rusts. I. A new cone rust on Sitka spruce. Can. J. Bot. 32: 432-439.

1959. Studies of western tree rusts. IV. Uredinopsis hashioka; and U. pteridis causing perennial needle rust of fir. Can. J. Bot. 37: 93-107.

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Wallis, Gordon W.

B.S.F. University of British Columbia 1951
M.Sc. University of Wisconsin 1957
Ph.D. University of Cambridge 1959

Publications:

Wallis, G. W. and D. C. Buckland

1955. The effect of trenching on the spread of yellow laminated root rot of Douglas-fir. For. Chron. 31: 356-359.

1960. Survey of Fomes annosus in East Anglian pine plantations. Forestry 33: 203-214.

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and G. Reynolds

1965. The initiation and spread of Poria weirii root rot of Douglas-fir. Can. J. Bot. 43: 1-9.

Molnar, Alex C.

B.S.F. University of British Columbia 1951
M.S.F. University of British Columbia 1954

Publications:

Molnar, A. C. and G. T. Silver

1959. Build-up of Pullularia pullulans (de Bary) Berkhour within a spruce budworm infestation at Babine Lake, British Columbia. For. Chron. 35: 227-231.

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and B. Sivak

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Molnar, A. C.

1965. Pathogenic fungi associated with bark beetle on alpine fir.
Can. J. Bot. 43: 563-570.

McMinn, Robert Gordon

B.A. University of British Columbia 1949
M.S. Washington State University 1950
Ph.D. University of British Columbia 1957

Publications:

McMinn, R. G.

1960. Water relations and forest distribution in the Douglas-fir region on Vancouver Island. Canada Dept. Agric., Forest Biol. Div. Publ. 1091, 71 pp.

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Bloomberg, W. J.

B.Sc.F. University of Wales 1942
Ph.D. University of British Columbia 1960

Publications:

Bloomberg, W. J.

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and Jack R. Sutherland

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1971. Phenology and fungus-nematode relations of corky root disease of Douglas-fir. *Ann. Appl. Biol.* 69: 265-276.

Funk, Alvin

- B.A. University of Western Ontario 1950
Ph.D. University of Toronto 1962

Publications:

Funk, A.

1962. *Durandiella pseudotsugae* n. sp.; taxonomy, cultural characteristics, life history and host response. *Can. J. Botany* 40: 331-335.

and A. K. Parker

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1966. *Scirrhia pini* n. sp., the perfect state of *Dothistroma pini* Hulbary. *Can. J. Botany* 44: 1171-1176.

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Smith, Richard Barrie

B.S.F. University of British Columbia 1957
M.F. Yale University 1958
Ph.D. University of British Columbia 1963

Publications:

Smith, R. B.

1966. Hemlock and larch dwarf mistletoe seed dispersal. For. Chron. 42: 395-401.

and H. M. Craig

1968. Decay in advanced alpine fir regeneration in the Prince George District of British Columbia. For. Chron 44(3): 37-44.

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Sutherland, Jack R.

B.Sc.-Agric. Ohio University 1958
M.Sc. (Botany) Ohio University 1960
Ph.D. (Plant Pathology) West Virginia University 1964

Publications:

Sutherland, J. R. and R. E. Adams

1964. The parasitism of red pine and other forest nursery crops by Tylenchorhynchus claytoni Steiner. Nematologica 10: 637-643.

Sutherland, J. R. and R. E. Adams

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UNIVERSITY OF BRITISH COLUMBIA

Vancouver

Forest disease teaching and research were placed on a permanent basis at the University of British Columbia, Vancouver, when Dr. D. C. Buckland took over the new Chair of Forest Pathology in 1948 as Associate Professor. To accept this new challenge, Don left his position as Officer-in-Charge, Canadian Laboratory of Forest Pathology at Victoria, a position to which he had been elevated but one year earlier. In his new capacity he was responsible for organizing and teaching several new pathology courses and for building up laboratory and library facilities. A great deal of valuable research was carried out, both by himself personally and by graduate students under his direct supervision.

During his undergraduate years at UBC, Don had spent his summers as research assistant in silviculture for the British Columbia Forest Service. While studying at Yale he served as instructor for aircraft lumber inspectors and between sessions there worked as forest pathologist, Canada Science Service in Victoria. It was from there he moved on to UBC. Though only thirty years old when accepting this new post, it is obvious that Don was already well trained and experienced.

Don had many activities outside those of his official position. He was a tireless worker in professional societies, the Yale Forestry School Club, the UBC Alumni Association, The Boy Scout movement, and the Canadian Institute of Forestry among many others. He was prime mover in keeping the Western International Forest Disease Work Conference on its always progressive but free-wheeling basis.

Don was only 38 years old when he passed away quietly at Vancouver General Hospital on February 15, 1956. In 1951 fate had struck him a cruel blow when he lost his eyesight. Even this, tragic though it was, failed to dampen his zest for life, but served only as a challenge to be met with a chuckle and overcome. Never strong physically, and frequently confined by illness, he nevertheless lived to the full every minute of his 38 years.

Later that same year, the vacancy created by Don's passing was filled when Dr. J. E. Bier accepted the Chair in Forest Pathology with the Department of Biology and Botany at the University of British Columbia. Jack held dual professorships in this Department and on the Faculty of Forestry until 1965 at which time his discipline came to rest solely within the Faculty of Forestry.

During his tenure at UBC, Dr. Bier was instrumental in encouraging a number of competent undergraduates to develop careers in forest pathology and in guiding graduate and postgraduate students in their research programs. Jack carried out a program of personal research, in later years stressing tree physiology and microbiology in relation to forest disease control. He approached this field with the vigor and enthusiasm which marked his entire career and did much to illustrate the complex interactions between host, pathogens, and the naturally occurring microflora.

Jack brought a wealth of experience with him when he joined the UBC faculty, most all of which had been with the Canadian Department of Agriculture. In 1940 he had established the first Regional Forest Pathology Laboratory in Canada at Victoria, B. C. After directing this laboratory for seven years, he transferred to Ontario and opened another Regional Laboratory for the then Forest Biology Division of the Department of Agriculture. Between 1951 and 1956 he served as Associate Chief of the Forest Biology Division in Ottawa, providing leadership and guidance to the forest pathology program throughout Canada.

Jack, too, died prematurely, passing away unexpectedly at his home in Vancouver, B. C. on January 24, 1967 when but 58 years of age. Thus was lost not just another fine teacher but an active member of numerous regional, national, and international organizations. He was especially active in the International Union of Forest Research Organizations, serving as chairman of two working groups and as a member of three others over a period of more than twenty years.

The Chair of Forest Pathology at UBC was again filled in December 1967 when B. J. van der Kamp accepted the appointment, a position which he still occupies.

APPENDIX

Buckland, Donald C.

B.A.	University of British Columbia	1941
B.Sc.F.	University of British Columbia	1942
M.F.	Yale University	1943
Ph.D.	(For.Path.) Yale University	1945

Students:

R. G. McMinn
Alex C. Molnar
A. K. Parker
G. P. Thomas
G. W. Wallis
Wolf G. Ziller

Publications:

Buckland, D. C. and E. G. Marples

1952. Management of western hemlock infested with dwarfmistletoe.
Brit. Columbia Lumberman 36(5): 50-51, 136, 138, 140.

_____ and E. G. Marples

1952. Rodent damage to western hemlock. For. Chron. 28: 25-30.

_____ 1953. Observations on Armillaria mellea in immature Douglas-fir.
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